AMATEUR RADIO

MARCH 1964

Vol. 32, No. 3

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★

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OUR COVER

During the recent Ross Hull Contest it was possible, due to the activity in VK8, to obtain W.A.S. on 50 Mc., so it is appropriate to show a collection of all VK Call Area cards. The reader should also refer to the Correspondence column (see page 17) and page 14 for the W.I.A. (V.H.F.) W.A.S. Rules.

FEDERAL COMMENT

★

As yet another Easter approaches, so does the annual meeting of the Federal Council of the Institute—the Federal Convention. This will be the 28th meeting of Federal Council at a Convention and could prove to be a momentous one in the long history of the W.I.A. One might ask why this one should be any more important than any other Convention at which matters of policy and the future operation of the Institute are discussed. The answer will undoubtedly lie in the presentation of the first draft of the new Federal Constitution.

This important aspect of the Institute administration was thoroughly discussed at the last Convention where guiding principles for its preparation were laid down. The Institute in the past on a Federal plane has been bound together as a whole only by mutual agreement between the Divisions which are autonomous bodies and as such are not obligated to a Federal amalgamation by law. The principles referred will now enable the Divisions to be bound to a Federal company by law yet still retain their own autonomy within their State boundaries.

The average member is perhaps unaware of the necessity for the existence of a Federal governing body—space would prohibit giving every reason why this should be so; however, the main one would be a central authority through which the voice of the Institute would be heard and which would guide and execute the policies expressed by the different Divisions. There are other functions it would undertake such as the publication of the magazine, the task of which has been that of the Victorian Division for thirty odd years, the Call Book and other tasks which have placed a financial burden and onerous duty on one Division. In our Institute which has been steadily growing through the years, the establishment of a central governing body will enable a more rapid growth to take place which is all-important if Amateur Radio is to survive in Australia.

There will, of course, be many other important items to discuss at the Convention in Adelaide, which is the venue for the first time since 1935. The success of this or any other Convention depends largely on the interest of the members of the host Division, and although Easter is a time when holidaying is prevalent, any members who can be present at the deliberations of the Federal Council are always welcome and can learn something useful about Federal administration of our Institute. We can promise an interesting experience for any visitors who can come along, and in addition we hope, a most profitable and momentous Convention from the aspect of decisions and policies.

FEDERAL EXECUTIVE, W.I.A.

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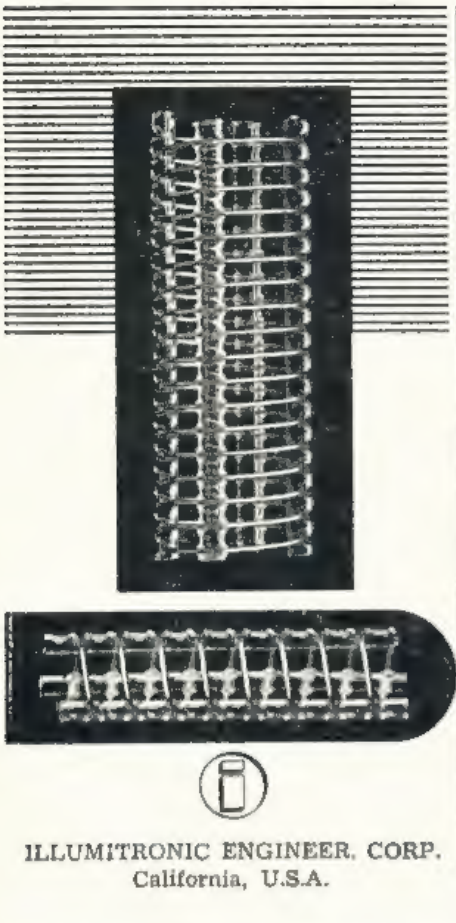

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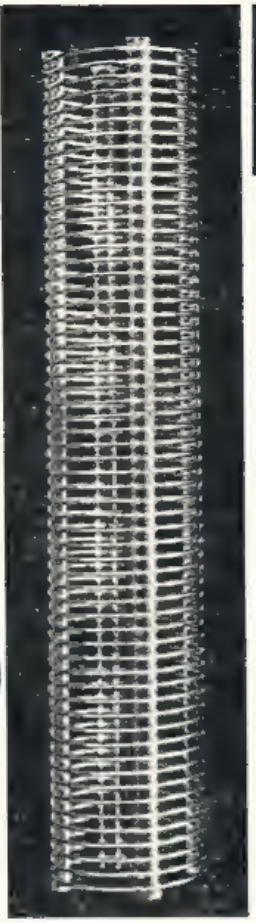

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A LOW-COST U.H.F. GRID DIP OSCILLATOR

C. HAGOORT, VK5ZKC, and B. CLEWORTH,† VK5BQ*

With the 70 Cm. band now available, some v.h.f. enthusiasts will want to construct equipment for this band. With this idea in mind, the writers have been experimenting with various circuits, tubes and layouts, and finally have decided on the following design.

No originality is claimed for the particular circuit used, however, it will be observed that the layout is novel and quite effective in practice.

Although it would be preferable to use tubes such as the 6CW4, which would result in a higher maximum frequency, we used the 6J6 because it is readily available and has a satisfactory maximum frequency capability (in this g.d.o., 550 Mc.).

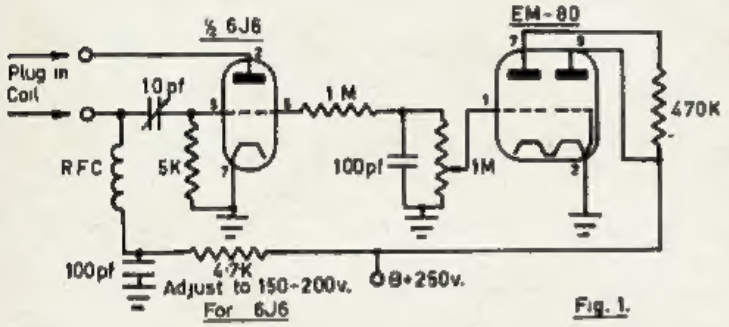


Fig. 1.

C1—100 pF.
C2—10 pF.
C3—100 pF.
R1—10K ohms.
R2—470K ohms.
R3—4700 ohms.
R4—1 megohm linear pot.
R5—470K ohms.

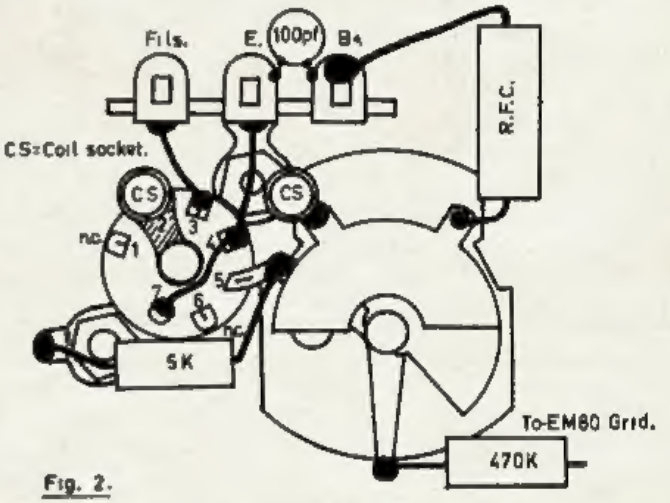


Fig. 2.

Everyone knows that the 6J6 will oscillate up to 600 Mc. with suitable tuned circuits, but it is not so easy to make it oscillate over the wide frequency ranges necessary for a practical g.d.o. This is further aggravated by the fact that the maximum capacity of the tuning capacitor will have to be reasonably large in order to provide as large as possible a frequency range with each coil. With these problems in mind, the series tuned circuit (Fig. 1) was tried and found to give the desired result. The only serious disadvantage is that the grid current varies over fairly wide limits, from maximum to minimum settings of the tuning capacitor.

To minimise this, a "magic eye" tuning indicator was used in both grid dippers since it has the advantage that it will cater for wider variations in grid current than a meter, the pointer of which can only be of assistance whilst it is "on scale".

In addition, it may be found desirable to use a sensitivity control as in the 5ZKC instrument. This is used to reduce the negative bias on the EM80 when the low end of each coil range is approached. Whether this is necessary will depend to an extent on the type of indicator used. A much older tube with no sensitivity control was used at VK5BQ.

The tuning capacitor used is a small single bearing type of about two plates at 5BQ, and three plates (10 pF.) at 5ZKC. The shaft of this tuning capacitor is "hot" for r.f. and will therefore have to be insulated if hand capacity effects are to be eliminated. The material used is polystyrene.

Next comes the problem of the coil socket. If the overall frequency range of the instrument is to be as large as possible, then plug-in coils are indicated. Insulating materials which are satisfactory at the lower frequencies are often very "lossy" at u.h.f. The problem has been overcome in the following manner.

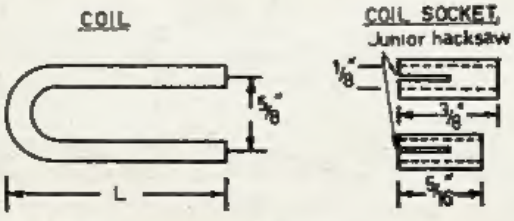
Two short pieces of brass tubing ⅛" inside diameter and about ¾" long are made into two little sockets by cutting four slots with a junior hacksaw as indicated in Fig. 3. One socket is soldered rigidly to the fixed plate of the tuning capacitor, and the other one directly to the plate pin of the 6J6. The plate pin is then braced to the centre terminal of the 7-pin socket with a "blob" of Araldite.

This method has the advantage that there is no additional dielectric loss over and above that in the valve socket and tuning capacitor insulation. Reference to the layout drawing (Fig. 2) will show how this socket is arranged.

The coils themselves are made from ¼" outside diameter copper tubing, bent into the shape of a hairpin loop. Finally, after calibration, they are finished with a piece of P.V.C. tubing pushed over them. This precludes the possibility of shock to the operator. A neat job will result if the tubing chosen is a very tight fit and pre-soaked in a solution of amyl acetate or duco thinners to swell it. When pushed over the coils and allowed to dry it will shrink back to its original size. Different coloured tubing for each coil can be used to facilitate identification.

The coils can be calibrated with the aid of Lecher lines. With care an accuracy of approximately 1% can be obtained with this method. As the exact dimensions of the coils will depend to an extent on the tuning capacitor used, the dimensions given in Fig. 3 should be taken purely as a guide. With the exception of the top one, the coils should be made longer than necessary and small pieces trimmed off until the required overlap in frequency is obtained. 10 to 15 Mc. will be ample. The total frequency range of the VK-5ZKC unit is from 285 to 555 Mc.

A scale can then be pasted to the outside of the case and calibrated from 0-100. Transfer this to the X axis of a graph, the Y axis of which is marked off in megacycles. Curves are then plotted for each coil in the usual manner. ●



Length of coils (approx)
A-2⅞". B-2¾". C-1 13/16".
C-1½". D-1".

Fig. 3.

* Larkdale Ave., Sydenham, South Aus.
† 14 Coronation Av., Campbelltown, South Aus.

CONSIDERATIONS IN RECEIVER FRONT-END DESIGN*

AL BROGDON, K3KMO/DJ0HZ

The author explains the importance of r.f. selectivity and linearity, and methods of improving this important characteristic

THE Radio Amateur is faced with a communications problem which is unique in many ways. One of these unique features is that the Amateur is allocated continuous non-channelised frequency bands through which he may romp at will. This is found in no other communication service. This freedom to choose an operating frequency, plus the fact that there are more Amateurs in the United States than can be comfortably accommodated by the frequencies available for their use, results in mass mutual interference. This over-population of the Ham bands will certainly never lessen; on the contrary, it appears as if it must become progressively worse. The major factors contributing to this increasing problem are the phenomenal rate of growth of the U.S. Ham population, and the increasing pressure to reduce the Amateur's frequency allocations.

Thus, we may look forward to more and more interferences on the high frequency Ham bands. Practically the only approach to the solution of this interference problem is that of narrowing the bandpass of the communication receiver until it is just wide enough to accommodate the desired signal.

In the typical communication receiver the high selectivity is built into the lowest frequency i.f. stages. The selectivity curves as shown in equipment specifications are principally the selectivity of these low i.f. stages. These curves lead us to believe that this is the performance capability of the receiver, but the sad fact is that this selectivity cannot be linearly transferred back to the antenna terminals of the receiver.[1] The reason for this is that the tuned circits of the receiver are linked by vacuum tubes (or transistors)—nonlinear elements. So the actual bandpass characteristics of the receiver will be degraded by the amount of nonlinearity in the transfer. Let's take an example to show the difference between the i.f. bandpass and the overall bandpass characteristics of a receiver.

On field day, there will often be two operating positions in close physical proximity but on widely-separated frequency bands. According to the manufacturer's (i.f.) selectivity curves, there should be almost an infinite amount of attenuation at such far-band frequencies. Yet the interference is present. Let us consider the reasons for the existence of this theoretically impossible interference.

The level of the undesired signal becomes so great that it causes the r.f. stage to draw grid current, causing any of a number of types of interference to occur. The sensitivity of the receiver may be seriously degraded due to the extra bias placed on the over-driven stages through the excessive grid current. Cross-modulation may result because of the overdriven stage's nonlinearity. Harmonics of the undesired signal are generated, which may cause a spurious response. Two strong signals may combine in an overdriven r.f. stage to produce intermodulation products. When one of these products falls at the receiver tuned frequency, it will cause interference.

With all of these possible sources of interference, it becomes obvious that the linearity and selectivity of the r.f. amplifier stages become very important in the reduction of interference from undesired signals. Although most Hams think of selectivity in terms of the i.f. selectivity, higher r.f. selectivity will pay off with better receiver performance in the presence of interference.

A.V.C. AND BIASING

The use of proper biasing techniques in the r.f. amplifier stages is an absolute necessity. No r.f. stage should be operated without self-bias, and a.v.c. bias should be applied to all r.f. stages (plus the i.f. stages if desired). Two sophisticated systems that are recommended are the "delayed" a.v.c. and "hang" a.v.c. systems.

A delayed a.v.c. system is one in which the receiver is operated with the r.f. stages at maximum gain until a received signal reaches a predetermined level, after which the a.v.c. voltage is proportional to the signal strength. The hang a.v.c. circuit was developed for use with c.w. and s.s.b. reception, and features a fast attack time and a slow release time. This results in a.v.c. action which is applied at the first syllable (or c.w. character) with an unnoticeable delay, and holds in between words (or characters) to maintain a constant output during a transmission.

R.F. RESPONSE

A spurious response can occur in a receiver when an undesired r.f. signal reaches the signal grid of the mixer. The selectivity of the r.f. amplifier determines the degree of rejection of the undesired signals. Therefore, the selectivity of the r.f. amplifier stages of a receiver must be considered over a wide frequency range. By injecting a signal at the antenna terminals of a 3 to 30 Mc. communication receiver, and measuring the voltage developed at the signal grid of the mixer stage it was possible to produce an r.f. selectivity curve. Thus it included the selectivity of all tuned circuits between these two points.

It was seen that the off-frequency attenuation rose to a maximum just above the tuned frequency, then gradually decreased and decayed into erratic valleys and peaks. The receiver under test was tuned to 14 Mc. The attenuation in the vicinity of the two metre band was only 30 db. Thus it would be possible for a Ham using the tested receiver on twenty metres to experience interference from a nearby Ham operating in the two metre band! Sometimes interference crops up in unexpected places.

It is possible to minimise the erratic behaviour of the off-frequency selectivity of the r.f. stages, although it cannot be entirely eliminated. The performance may be improved by using minimum lead lengths, shielding between stages, filtering of all leads except signal leads, and the usual good design practices. In addition, the overall far-frequency attenuation may be improved through the use of external selectivity aids.

Most Hams nowadays use a common antenna system for both receiver and transmitter, with either a T-R switch or antenna change-over relay to connect the antenna feed-line to the transmitter and receiver. Also, most of these Hams use low-pass filters to minimise t.v.i. If the antenna change-over system is such that the filter is between the receiver and the antenna, when the switch or relay is in the receive position, it will provide an additional 30-80 db. of attenuation above its cut-off frequency. Also, some T-R switches themselves are frequency selective, giving the user an additional off-frequency attenuation of perhaps 10-30 db. Various bandpass filters have appeared in the Ham magazines specifically for use in multi-transmitter contest operation, and will provide additional attenuation of undesired signals. All of these may be used to increase the r.f. selectivity of a communication receiver.

R.F. PREAMPLIFIERS

It would seem at first glance that the r.f. selectivity of a receiver could be greatly improved through the use of the commercially available preselectors. Actually, this title is not entirely accurate, since the units are primarily designed to act as preamplifiers, and may or may not have good selectivity characteristics. An example of this is the line of R.M.E. preselectors. The old DZ-22A was not only a good high-gain preamplifier, but provided outstanding preselection through its three gang-tuned circuits. However, the current R.M.E. preselector, the DB-23, has only one tuned circuit for each frequency band. The preamplification is excellent, but the preselection is very poor. At some points, the rejection of far-frequency interference may only be 18-20 db., which may lead to interference being generated within the DB-23 itself. Thus, the DB-23 would be a very useful addition to a receiver if

(Continued on Page 13)

* Reprinted from "CQ", July 1963.

[1] Brogdon, A., "Two-Signal Selectivity Measurements," "CQ", August 1962, page 60.

INTRODUCTION TO CERAMIC DIELECTRICS*

PART TWO

H. F. RUCKERT,† VK2AOU

CERAMIC DIELECTRICS
An Engineering Problem

The case of Centralab, U.S.A., gives some idea of what is involved.

Centralab, a leading U.S. ceramic capacitor manufacturer, stated in 1948 that 30 ceramic and electronic scientists and engineers worked 150,000 hours preparing 25,000 HK compositions, but only two of these were used for mass production. Further, they stated that it will take them 15 more years to evaluate all measuring results and investigate special observations more closely.

This statement underlines the complexity of the job and the nearly infinite number of possible combinations. As one may well imagine, we could not do the development of ceramic dielectrics on such a grand scale in this country, but this example shows how much work is involved if one wants to reduce the chance of overlooking possibilities.

Our Job: In our profession, it usually goes like this:

A customer sends us a t.v. circuit and wants a suitable capacitor for a certain application, or he sends us some foreign capacitors and wants us to make exactly the same type. If we find something interesting in a technical magazine or in the patent literature, then a new developmental programme may be initiated, and the same is the case if we have a new idea ourselves.

In all the cases we have to translate electronic properties into chemical formulations, and these into ceramic processes (without a dictionary). Next, we have to prepare and measure ceramic capacitors, evaluate the results, and correct the formulation and change the ceramic processes to achieve the required properties more closely. This often means that electronic measuring techniques and new ceramic processes have to be developed. Production and measuring techniques have to be well understood, or the results will be misleading.

SOME CERAMIC DIELECTRIC FORMULATIONS

LOW LOSS STEATITE

Typical insulator porcelain, at 1 Mc., has a P.F. 30 to 100 times higher than good mica or ceramic. The TC_c is many 100 parts per million positive, and the I.R. falls rapidly at elevated temperatures. The alkalis were found to be mainly responsible for this, and it was also found that the same is so when glass compositions were tested. This means that we cannot use feldspar or clay with a high flux content, mainly sodium is dangerous.

The low loss steatite, composed of very pure talc (HgO-Al_2O_3-SiO_2) plus carbonates of earth alkalis (Mg, Ca, Ba) and other oxides as mineralisers, was the answer. Only small amounts of clay, contributing traces of flux, have to be added often to achieve vitrification below 1,400°C. The low P.F. of 0.04%, high I.R. of up to 10^{13} Ω/cm. at 200°C., and the low K of 6 to 7 make this material very suitable as r.f. insulator, where low, stray capacities are required.

The TC_c of P140 to 180 was more important in the past, because iron dust cores in coils of tuned circuits had a negative TC of the permeability and the resulting frequency drift could be compensated with steatite capacitors (German trade names, since 1932, are: Calit, Frequenta). L.L. steatite is widely used in switches, valve holders, terminals, v.h.f. coil forms, transmitter aerial insulators, etc.

LK DIELECTRICS

The electronic industry required dielectrics with higher K factors to be able to make less bulky capacitors. Suitable mica was not available in Germany around 1930-34, but they remembered a patent of Schmidt, 1902, in which he had found that TiO_2 had a K factor of 117. Then the Hescho and Stemag Companies developed, during the period from 1934 to 1938, a range of LK dielectrics with:—

K Factors of	14	40	80
TC_c	NPO	N400	N750
P.F.	0.02%	0.2%	0.1%

and 1938/1939:—

K Factor	40	
TC_c	N120	N250
P.F.	0.02%	

Nearly all the shapes and styles still used all over the world today were developed by these two firms about 25 years ago. The compositions used in those days were relatively simple:—

TC_c	Mainly containing	Trade Name
NPO	MgO and TiO_2	Tempa S.
N120	La_2O_3 and TiO_2	Tempa T.
N400	Clay and TiO_2	Condensa N.
N750	10% Clay & TiO_2	Condensa C.

These dielectrics had peculiar properties.

- The NPO needed 1,450°C. to fire dense.
- The N120 shrank about 50% (extruded tubes).
- The P.F. increased 100 times at 800 c/s., 100°C., and the TC_c became P7000 under the same conditions.
- The N750 had a P.F. which was too high at A.F. before ZrO_2 was added.

The best bodies do no longer contain any clay.

Many compositions have changed since and they often contain up to 6 or 8 oxides, most of which have been pre-reacted in groups during a calcining process. One group allows for the adjustment of the TC_c mainly, and another group influences the K factor. Again, other additives improve the P.F. so that there is no deterioration under accelerated life test conditions (100°C., 100V/thou.), which could cause in some cases a partial reduction of TiO_2, affecting P.F., I.R. and breakdown level.

The importance of temperature compensation was gradually appreciated more and more by radio designers, and this requirement had to be satisfied for all Armed Forces' equipment, and now too for domestic receivers. The introduction of ferrite coil cores for inductances of tuned circuits called for higher N TC_c capacitors for the achievement of good compensation of frequency drift.

These are the reasons why we have all over the world now 17 standard TC_c values of:—

P150	P100	P33	NPO
N33	N75	N150	N220
N330	N470	N560	N750
N1500	N2200	N3300	N4700
N5600.			

It seems to be possible only to produce high P TC_c values either with a low K factor or with a high P.F. The more common oxides of Zn, Sn, Zr, Mg, Ba, etc., are often used, which give suitable P.F. and K factors if just sufficient TiO_2 is added to achieve the desired TC_c. The N750 body is still to 75-90% of TiO_2, but much research work had to be carried out to overcome the P.F. increase occurring formerly after flash tests. The more negative TC_c values can be obtained with alkaline earth titanates such as Ca and Sr, but other oxides have to be added to obtain the properties which are now world standard.

The highest K associated with low P.F. and the standard TC_c is the target, but practical production requirements have to be considered as well. An LK series which would require a different firing temperature for each TC_c type would be quite a costly nuisance for tunnel kiln operation; also, the TC_c and P.F. should not depend too much on the firing temperature (±25°C.).

It is now possible to make NPO or N750 bodies with losses so small that discs ¼" thick, with an oil-protected surface, have a P.F. so low that many well known Q meters do not register a P.F. at all. It is, therefore, not surprising that transmitter plate type capacitors using these dielectrics have almost entirely replaced the much larger and more expensive mica capacitors.

HK DIELECTRICS

It was around 1941/42 that the high K factor of Ba TiO_3 was discovered in U.S.A., Germany, Japan and Russia. However, most of the early work on HK bodies was carried out by Dr. E. Wainer, of the Titanium Alloy Manufacturing Co., and the many patents are proof of the tremendous work done and the important results achieved.

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* From a Lecture given to the Ceramic Society of Australia (N.S.W. Division).

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The K factor vs. temperature curves or TC_c graphs are most important in comparing HK dielectrics.

The graph, Fig. 1 (curve 1), shows the TC of the K factor of 99.8% pure Ba TiO_3, and the curve II. gives an indication of the importance of having the correct stoichiometric ratio (+6% Ba O). The reduced K factor of curve III. shows one reason why clay is usually no longer found in capacitor dielectric formulations. Too much milling jar and pebble material have been ground off and contaminated the Ba TiO_3.

In Fig. 2 we see the temperature v. K curve of Sr TiO_3 and Ca TiO_3. The obvious aim was to shift the Curie Point of Ba TiO_3 from +120°C. and the K peak of Sr TiO_3 from —100°C.

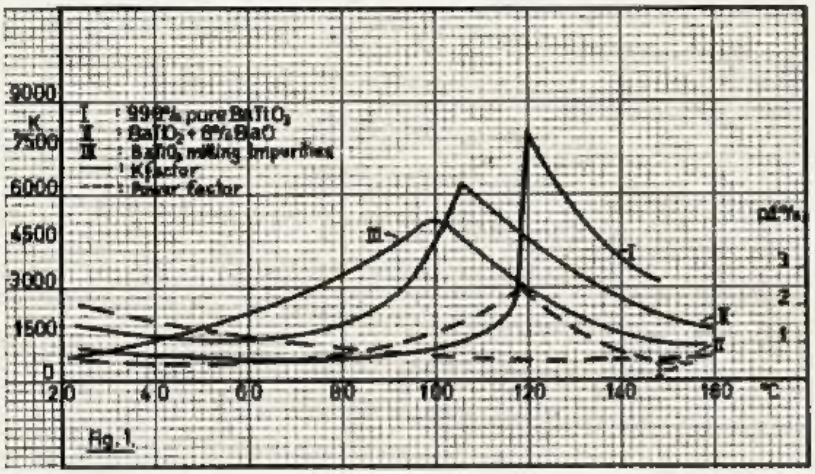


Fig. 1.

or so to the usual operating temperature of about 30 to 40°C. for radio and t.v. receivers, in order to raise the usable capacity.

By combining Ba TiO_3 and Sr TiO_3 in a ratio of 80 : 20 parts, we can achieve this first aim.

The next target was to broaden the peak, to reduce the TC_c or to increase the K factor below and above the K maximum.

In spite of the tens of thousands of combinations made, the hundreds of patents claimed, and the trying of all metal oxides listed on the periodic table —including rare elements—it was not possible to achieve a K : 5.000 or 10,000 NPO body.

Figs. 3 and 4 demonstrate how additions to Ba TiO_3 can modify the K vs. temperature curve.

Many titanates, stannates and zirconates are being produced in commercial quantities by T.A.M., to be available as additives to Ba TiO_3.

It may be of interest to know that Ba can be replaced by Niobium, but the higher cost makes this material unattractive. When developing an HK dielectric, we can first try to obtain a certain maximum K, then an acceptable TC_c, next a good break-down voltage of 8 kv. d.c. per 0.030" material thickness, a P.F. of 2% or less, and an I.R. of 10^5 MΩ per ¾" diam. disc. The raw materials needed, to achieve these developmental steps one by one, must be readily available and of a sufficiently consistent quality (BaO/TiO_3 ratio, type of impurities, percentage of impurities), and the price must be small compared with the labour cost of the product.

After satisfying the electronic requirements laid down by the customer or the world-wide standard of development, our ceramic production men call for modifications, so that the new mixture is easy to press or extrude, that the kiln furniture does not become contaminated, that the existing furnace does not cause heat-shock cracks, that warping does not occur, that firing in layers without a separating medium is possible, and that an already used production firing temperature below 1380°C. will give all the listed properties achieved in the laboratory. Quite often, we have to start all over again and again, trying to fit one more requirement in a scheme developed so far, without losing other valuable features.

We, therefore, have a sample collection with capacitors from all tests in several thousands of numbered envelopes. All measuring data are being recorded in a library of lab. record books accumulated over 10 years. Quality control tests, with statistical evaluation of results and 2,000 h. accelerated life tests with climatic cycles, are carried out next, before a dielectric is approved for mass production of capacitors. If, finally, the customer does not like it, then the project has to go back to the ceramic lab. once more.

PIEZOELECTRIC BODIES

Most bodies containing Ba TiO_3 become piezoelectric after polarisation. This is usually done by heating the capacitor up in oil above the Curie Point (130°C.), applying 100v./thou. and cooling the parts down gradually with the voltage applied. In recent years, PbO-ZrO_2-TiO_2 bodies have gained importance, because their resonance frequency and piezoelectric coupling factor is far more stable with time and temperature. They often contain other oxides as well.

The firing of bodies, which contain PbO to over 50% dense, presents many problems. Lead vapour atmosphere of the right pressure, saggers and kiln furniture, which do not become fused by lead vapour, have to be used, to prevent too much shrinkage, porosity, distorted shapes and an unbalanced composition. Used in transfilters as radial mode overtone resonators, uniform structure and diameter are very

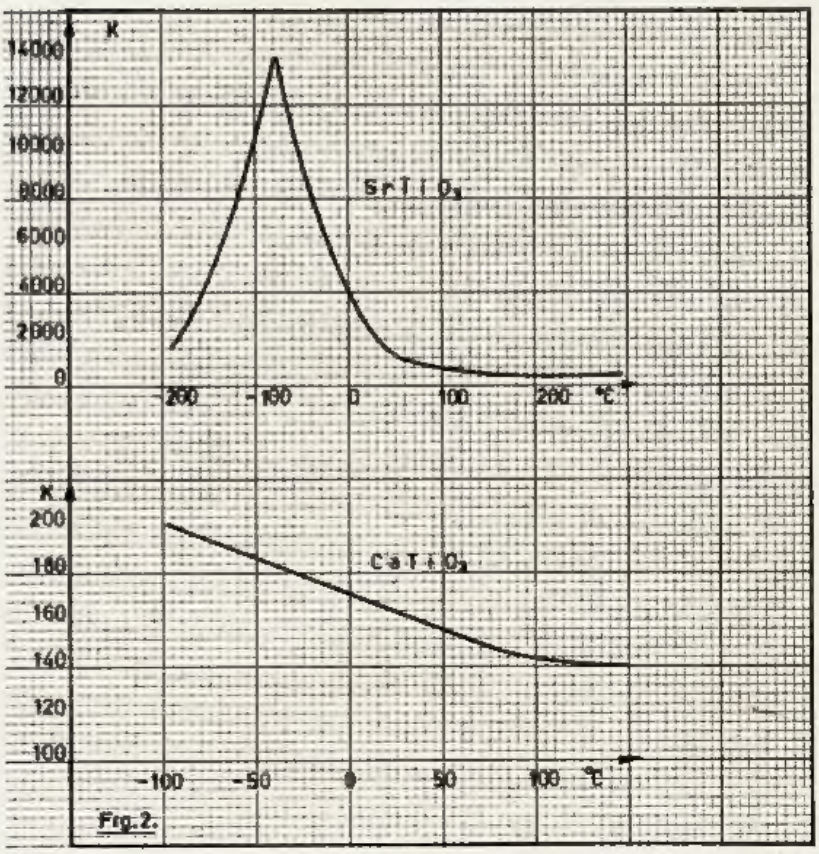


Fig. 2.

important to obtain low insertion loss, selectivity and few spurious resonances. These dielectrics are now becoming very important as more applications are found.

SEMICONDUCTOR CERAMICS

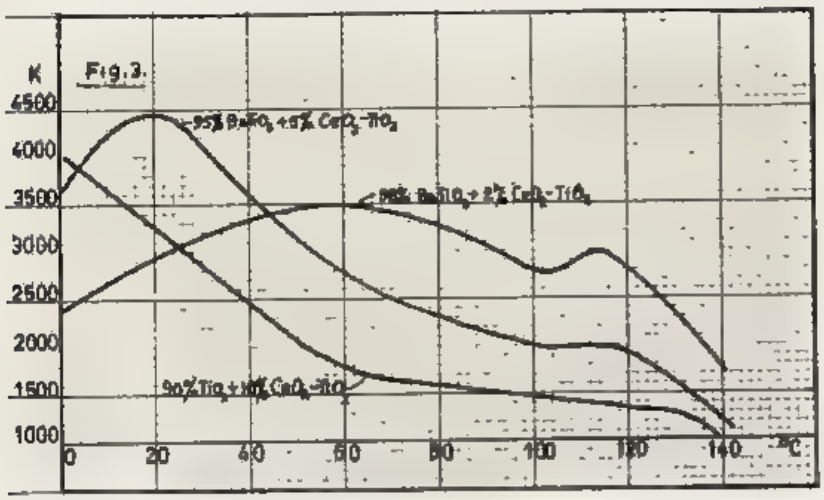
Semiconductor ceramics have been used in Germany since 1946 as heating elements in hot plates and cigarette lighters containing TiO_2, iron oxide, tin oxide and other ingredients. Uranium dioxide has long been used in thermistors by Siemens in a.c.-d.c. radios. Some ferrites and modern thermistor bodies also come into this class. Semiconducting bodies have also been developed using transistor-like techniques. The following three types may be mentioned:—

(i) To increase the capacity per unit of component volume, as required by modern miniaturisation (transistor sets, space rockets), thin sheet HK pieces can be stacked by interposing alternatively conducting ceramic thin sheet pieces to act as electrodes (compare stacked mica and tin foil capacitors). The latter ones are composed of titanates and iron oxide. The stack is fired to form one block, which is not as fragile as individual silvered thin sheet pieces, 0.002" to 0.010" thick, made by various manufacturers.

(ii) The oxide skin type of dielectric is formed by adding a small percentage of rare earth titanate to an HK body. When this body is fired in oxidising atmosphere, a typical HK ceramic results, with an I.R. of 10^5 MΩ and a certain Curie Point and HK P.F., but, in reducing atmosphere, a material which is nearly black of very low I.R. is obtained. If now these pieces are reoxidised on the skin, by firing under suitable conditions, we can achieve an extremely thin oxide dielectric skin on a robust disc. In this way, effective apparent K factors of several millions are obtainable. In fact, we have two HK capacitors in series with a common ceramic semiconductor inner electrode. Highly sensitive piezoelectric transducers can be made in this way.

A ceramic diode results if one skin is damaged or broken down, because now the conductor electrode contacts the ceramic semiconductor. The TC_c can be made quite low by adjusting the composition. Due to the thin dielectric, 0.0005" for 30v. types and far less for 3v. units, even this low voltage represents a very high field strength, and the capacity drops considerably with increased voltage. Even so, the I.R. reaches 1,000 to 10,000 MΩ and the breakdown voltage is usually 150 to 800v. for 30v. types. We were among the first few countries and firms in the world to market this type of capacitor. In the lab., we achieved, with a special process, up to 30 μF. on a ½" diam. disc, suitable for 3v., but this type is not yet on the market. That is 4,000,000 times the capacity a porcelain disc of the same size would have.

(iii) The barrier layer capacitor does not use a true ceramic dielectric any more. The ceramic is usually Ba TiO_3 with a critical Ba O to TiO_2 ratio doped with a small and critical amount of a rare earth or other oxide, which will affect the Ba TiO_3 crystal structure in such a way that the body becomes a semiconductor already when fired in air.



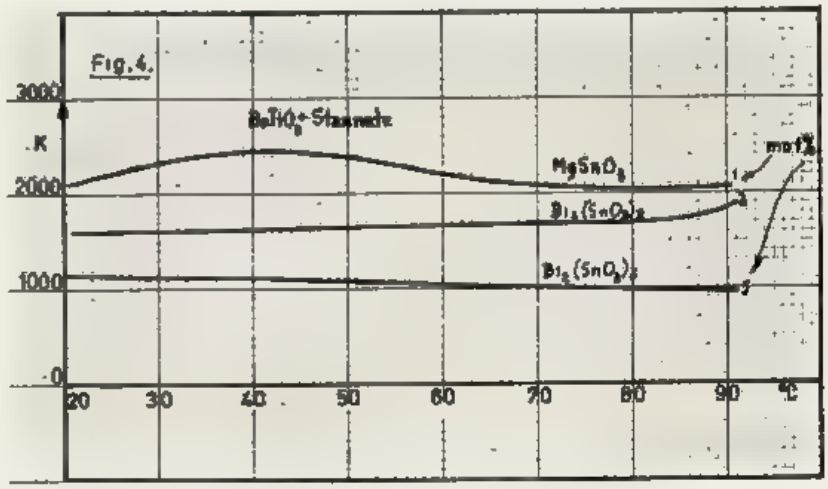
With commercial grade titanates, which have 2 to 3% impurities, and which may be out of balance by up to 4% as far as the stoichiometric ratio is concerned, firing under reducing conditions is still necessary to obtain the best properties, but reoxidisation is not attempted in this case.

At the interface of the semiconductor (here a ceramic) and the conductor (here the silver electrodes), diodes or rectifiers are formed. If we use indium or nickel as one electrode, to obtain an ohmic contact on this side of the ceramic and no diode, and silver on the other side, we will see that a d.c. current will pass 1,000 or more times better through this junction in one direction than in the other direction. An N type diode effect is being observed. (This is a simplified picture).

Usually, we have silver electrodes on both sides of the semiconducting ceramic, forming two similar diodes with opposing polarity, so d.c. current is greatly hindered in both directions by the reverse resistance of one diode for each polarity, and it looks, therefore, like a typical capacitor. The actual dielectric is formed by the reverse field causing an electron depleted area called double layer occurring at the interfaces of the semiconductor and suitable conductor due to their inherently different number of free electrons.

That is why the TC_c, piezoelectricity and other dielectric properties of the ceramic, otherwise expected due to the HK type composition, cannot be found any more on these diode components which can be used as capacitors. The maximum working voltage, in combination with an acceptable I.R. or leakage current and P.F., is usually 12v. 1 μF. capacity on a ½" diam. disc for 3v. and an I.R. of 20 KΩ or 0.5μF. with 300 KΩ I.R. are possible.

One U.S. firm has produced this type of capacitor for over a year, and five more firms have marketed these capacitors in recent months. We have developed similar units also. The TC_c and voltage co-efficient of the capacity are low, but the leakage current is more in the order of the values measured on electrolytic capacitors. (We may even call the electrolytic capacitor a wet ceramic capacitor having an aluminium oxide body, and other combinations are possible, also.)



Some 200 millions of ceramic capacitors have been made in this country in recent years, doing their job in radios, t.v. sets, ships, aeroplanes, transmitters, fluorescent lights, and many other applications. ●

ACKNOWLEDGMENT

The permission of the management of Ducon Condenser Pty. Ltd. to present this paper is gratefully acknowledged.

THE EDITOR REGRETS . . .

that certain actions taken by the Publications Committee have not been fully understood by some Amateurs, so this article is published to further explain the Editorial in the 1963 October issue of "A.R."

"Amateur Radio" magazine has a fixed income so that as further demands are made upon the Publications Committee to add additional features, it is necessary to adopt either one of two courses of action. If the magazine is made larger, costs will be increased and there is not enough money available to pay for the larger size issue. Therefore if additional items are to be added, space can only be made available by reducing that already taken up by existing features.

Over the past years articles devoted to S.W.L., Y.R.C. and S.B. have been added to the magazine, as your Committee believes that many readers are interested in these, and other subjects. But by publishing all such matters it has reduced the overall technical content of "A.R.," and it is considered that most readers would prefer to have technical articles.

Accordingly it was decided to reduce the amount of space allocated to non-technical matters. It has never been said, nor has it ever been the intention of the Publications Committee not to publish any notes from the various sources

Due to the Christmas holiday period, together with the close down for annual holidays, it was not possible to publish any notes or Hamads in the February issue of "A.R."

The above brief outline explains the broad principle behind the facts previously stated in the October "A.R." Editorial. The following paragraphs give a more detailed statement regarding specific matters about which some Amateurs are making incorrect statements. These are the facts.

DIVISIONAL NOTES

Divisional Notes from all sources will still be published in "A.R." and all correspondents are asked to forward their notes each month. However, the amount of space that will be made available will be reduced, so correspondents should not be offended if some of their notes are omitted.

Never has it been the Committee's intention not to publish Divisional Notes. The October Editorial suggested that correspondents should publish purely local matters in their Divisional Bulletins, and forward items of general interest to "A.R." for inclusion in their Divisional Notes. Regrettably, some correspondents have not forwarded any notes and whilst it is not correct to name any one in particular, the Committee consider that many Amateurs miss the omission of the VK5 notes.

The facts are that "A.R." will publish Divisional Notes but less space will be made available. It is suggested that correspondents forward about one-third less notes, so reducing their space requirements. This will save time in editing

Similar comments apply to the notes from the V.H.F., S.W.L., Y.R.C. and DX sources, etc.

Remember that "A.R." will still publish the various notes, but we cannot give each correspondent as much space as he would like. This can only be done when more money is made available to publish the magazine. Each page costs about £13 and at present we cannot afford to add more pages each issue.

SIDEBAND COLUMN

The Sideband column has been temporarily discontinued until such time as a suitable sub-editor is obtained. When the facts became available to your Committee they were faced with the problem of producing three issues of "A.R." in the one month. Rather than add to their problems, they decided that the matter of publishing the Sideband column would be held over until early in 1964 when they could more fully consider it. Due to misunderstandings, statements are being made that "A.R." will not publish a Sideband column.

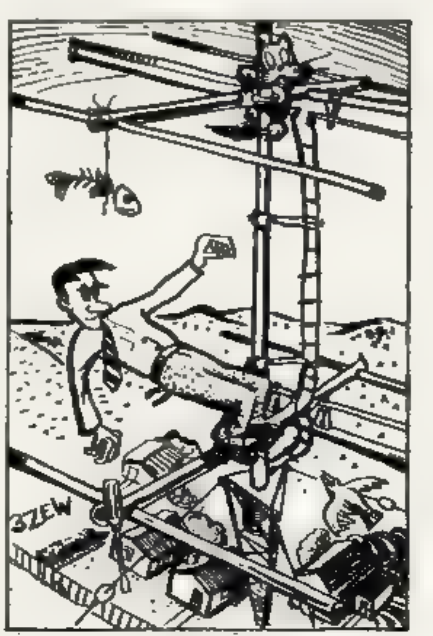
This is not a fact. Technical matters dealing with Sideband will again appear in "A.R." as soon as we can obtain the services of a suitable volunteer sub-editor.

PREDICTION CHARTS

When the Ionospheric Prediction Service advised the Publications Committee that they could no longer provide the Prediction Charts in the form they had previously appeared, we had no option but to discontinue this service. No one on the Publications Committee is qualified to prepare suitable charts from the current information supplied by I.P.S. To publish this information in graphical form, as is currently provided by the N.S.W. Divisional Bulletin, would cost "A.R." a very large sum of money. As already stated, we have not the funds available to do this job.

Until such time as we can afford to publish the charts in graphical form, or until some reader will volunteer to prepare such charts in another form, your Committee has no option but to temporarily discontinue this feature.

Suggestions from any reader on the matter would be welcomed and you may be assured that we will give every assistance to again provide this feature in "A.R."



"The Amateur is Balanced"

PUBLICATION DELAYS

"A.R." is run by an honorary voluntary committee who meet on the second Monday of each month. At this meeting all matters addressed to the Publication are considered and acknowledgment sent to the writers.

Technical articles have to be read and where necessary alterations made to the text and drawings have to be prepared in the majority of cases. Thus it is very rarely that a technical article can be published in the next issue of the Magazine. Generally three months at least will elapse from receipt of the article to its publication.

Some Amateurs overlook these details and become intolerant of the delays in seeing their article in print. They should realise that much work has to be done before their article is printed, particularly when detailed drawings are needed.

Your Committee does welcome readers' comments, not necessarily for publication, and if you are prepared to write you can assist to guide us in issuing a magazine you want. Remember, however, that we are limited by finances. We can only do what we believe to be correct. You must guide our thinking.

As Amateurs we possess two vital forms of communication, a magazine and our hobby, Amateur Radio. Yet problems still exist as the message does not always get across. Instead of passing unfavourable comments to your fellow Amateurs, why not advise the Publications Committee direct? In any organisation critics will aways be found, yet it is always difficult to obtain volunteers to do any job.

Amateur Radio is our hobby, yet to cater for you, by preparing a magazine, requires some persons to devote much of their free time. Perhaps you may be prepared to also assist by some contribution to "A.R." Your committee can only prepare a magazine within their financial resources, hence many good ideas have to be rejected, not because we disagree with them, but because we cannot pay for them.

Any Amateur is welcome to attend any Publications Committee meeting or to serve on the committee. The door is always open, so please come in!

—K.M.C.

DX

Sub-Editor: Bert Behenna, VK5BB.

Greetings fellow Amateurs! As your new DX sub-editor I find activity fairly low over the festive month of December. It will take some time to familiarise myself with this new chore.

I will make the plea to one and all, please send any news you may have on any piece of paper providing it has not been used previously.

Al VK4SS has been inactive except for a few contests, but has worked the following 2.5 Mc.—W8ADN, WA8MGO, UA8PP (1300z) 7 Mc.—UP2KCA, VU2GG, DU1NL, YO9HF, OK1HA, OK1BY, OK1KH, MP4BBE, CN8FR, KP4BNI, ON5ZO, 5A1TW, HM1BW, G5DQ, G2PT, G6AB, MP4TAS, UI8CK, 4S7RN, VS6HAA, VQ4IN/VS9H, 5B4KN, 4X4DH, DU8RP, VU2PT

20 mx c.w.: Ken VK3TL—AC5PN, CR8AD, OC2FMV, ET3GC, HP1IE, HZ2AMS, MP4QBG, SU1IM, 8V0WOD (Dodecanese), VP2KJ (Nevis), VK9MD (Xmas), VP8GQ, 9Q5AB (Congo)

20 mx s.s.b. Ken VK3TL—AC7A, PJ3AO, VP2KJ (St. Kitts-Nevis), VS6AKH, YN1LH, ZB1A, 5Z4F, 6O1KH, 8A3CP, 9Q5AB, HC8FN. Pete VK5FM—KC6BK, DM2AND, MP4PBQ, II1FBI, K8LCX, MP4QBF, UA4FF, UA6AL, UD6BW, WA6SBO, WB6DEX (Ross Adey), UA6KMP, II1CZE, 8P6GX, LZ1DO, YO4AH, GM3AR, GM2DQ.

15 mx: Al VK4SS—JT1CA, UA0KFG, UA0OH, OH1PN, SM5KV, VE7EH, UA9KDA, ZK1AR, KG4AAY (mostly around 0700z).

NEWS AND NOTES

Al VK4SS received VK/001 Certificate for 7 Mc. in 1962 OK Contest.

Is anyone working 28 Mc.?

BY1AD has been heard on 14 Mc. c.w. working stations outside Iron Curtain. Try 1000z.

TIEHP is first s.s.b. to have 300 confirmed.

VS4IH, VS4MD, VS4RS—all active on 14 Mc. c.w. from Sarawak (1000z).

TU2AU active 14080 kc. Operator is W6HMI (1400z).

QSLS RECEIVED

Ken VK3TL: YS1LA, 4U1SU (Egypt), FR7ZC/T, ZP5CF, AC5A, AC5A/AC4, AP2AR, HZ1AB, YV0AA, VP2AV (Antigua), 5B4CZ, VP2SY, 9G1DY, YS1M, VP9BY, ST2AR.

SOME QTHs

SU1IM: I. Braham, 7 Roda St., Cairo (U.A.R.).

VQ8GQ—Via G3PAG.

VP2KJ—Via W4ZSU

SV0WDD—39 America St., Rodos, Dodecanese.

HC8FN—Via WA2WUV.

5A3CP—Via G3HFH.

9Q5AB—Via W2HMJ.

CE0ZI—Via W4QVJ, Box 3045, Jacksonville, Florida.

EI0RDS—Via I R T.S., 24 Wicklow St., Dublin 2, Eire.

FK8AU—Box 637, Noumea, New Caledonia.

KS6BA—P. Hodges, Box 307, Pago Pago, American Samoa.

HS1L—Via W7YB.

XW8AL—Via K4KT4.

VS4IH—B. Shirlow, C/o. G.P.O., Kutching, Sarawak, Malaysia.

KV4CE—P.O. Box 1611, St. Thomas, Virgin Is. of U.S.A.

HS1B—Box 1038, Bangkok, Thailand.

5N8LJM—C/o. Airport Commandant, Aviation Division, Kano Airport, Nigeria.

XW8AU -C/o. Box 44, Vientiane, Laos.

VK4JQ on Willis Is. is very active on 20 mx s.s.b., giving many a new country, seems to be very fair, and gives all a good go; nice to hear.

Would all accept wishes for '64. Please, would all who can give any assistance to this column do so. Thanks in anticipation. Thanks to Al VK4SS, Ken VK3TL and Pete VK5FM. 73, Bert, VK5BB.

VHF

Sub-Editor: Len Poynter, VK2ZGP.

No one can say that the v.h.f. enthusiasts did not make good use of their last months on 50 Mc. From mid November until mid January the 6 mx DX enthusiasts have had a field day. The activity during the Ross Hull Contest reached a peak around the 20th December and remained that way until the first week in January. All States were well represented, particularly VK8. This was to prove the highlight of the season for many operators who were able to work their first VK8 and complete the tally for 50 Mc. W.A.S.

From early indications at least 50 will make the grade, including your scribe who completed the deed after a three-year wait. This is nothing when compared with Rolo VK6BO who has patiently waited 14 years. At the height of the season numerous Amateurs ideally situated made W.A.S. in a matter of a few hours and repeated the effort on a number of occasions. Call areas VK1-2-4-5-6-7-8-9 were worked from VK3 and it is a pity VK0 was not available to present someone with a W.A.V.K. Call Areas—50 Mc. This could be a distinct possibility within the next few years.

Two metres was not living up to expectations and only two openings occurred. On Dec. 24 VK2ZKP and VK2ZCF worked ZL1AUM and ZL1ADE, and later in the month VK4-VK5 contacts were made, but nowhere near the opportunities as in previous series.

ZL openings were numerous on 6 mx right from mid November, throughout the season, until early January. Activity from VK3 reports was quite low from ZL. The N.Z. t.v. Channel 1 made it easy to monitor openings in this direction. We are still rather mystified by the reception of the t.v. at S9 plus level and not a sign of a ZL. One ZL4 appeared on a few openings but gather from reports only a few made contact.

A number of stations made the 1,000 mark during the contest. The general feeling that the period should still continue but submitting only a log for a seven-day period. It gives those not favourably located a chance to do good. However, it will be worth while seeing how the change in bands will affect those particularly in VK3.

432 Mc. opened solidly in most States on 1st Jan. First reports indicate quite good results. This column will be pleased to publish details of distances worked and records as they are made and broken. Who has worked the longest distance to date? The restriction on using only 432-436 Mc. portion will cause some change of plans for the t.v. enthusiasts, but this will be overcome in time.

Well so much for this month. With the big lapse in time since the season I hope readers will excuse the departure from normal routine. I trust some party or parties will be interested in the letter from KH6 (see Correspondence column) and will write for further information. Who will be the first lucky VK?

Don't forget those notes each month. Due to the new set-up, please confine your items to a resume of local activities. More detailed reports on 144, 432 and above would be in order. Time your letters to arrive by the end of the month. 73, VK3ZGP.

SWL

NEW SOUTH WALES

If January is an indication of months to follows, the VK2 Group should be in a better condition than for some time, as during that month correspondence has increased, which shows a greater interest. I would like to thank the following s.w.l's. for their letters, L2022, L2233, L2258, L2251, L2269, L2031 Norm L2231, an old Sydneyite, gone to VK4. Very pleased to hear of your whereabouts. When you get that aerial up, let me know of your DX.

Don L2022 writes of QRM bother, also of intending to get a new rx plus the erection of a better antenna. Hope you are successful in both ventures.

Ross L2233/VK4, in the Toowoomba area, has been on leave (Army Sigs), but reports that he has received his N.F.D. award, congrats. OM.

Sid L2258 reports having heard on 14 Mc. II, YO, SV, KR6, KG6, G5, VS1, HB9, DL4, EA7, etc. The AMR300 must be really going well.

Chas. L2211 says that the v.h.f. season was the best for many a year. Best on 50 Mc. was VK3 in Darwin, plus a VK2 in Armidale and Inverell, both under 300 miles.

Several s.w.l's. took advantage of my offer of the booklet, "A Lot Depends on Your Aerial," and I trust they found the information very helpful. Copies are still available. Just send your request to me plus a stamp. If any member would like QSL cards printed at a very reasonable price, let me know, and it can be arranged.

Thought for the month: Learning only won't make a job safe. Safe application of technical know how will.

73, Chas. L2211.

LIC. LAWLER

	Countries Conf.	Countries Hrd.	Zns. Conf.	s.s.b. Conf.	s.s.b. Hrd.	W Stat.
E. Trebilcock	262	259	40	—	—	50
D. Grantley	113	273	38	20	104	35
A. Westcott	93	159	31	9	107	11
M. Hilliard	84	239	33	33	168	12
P. Drew	80	232	28	34	171	22
M. Cox	80	252	31	48	163	21
C. Abernethy	57	100	31	—	—	—
G. Earl	46	142	25	25	119	5
N. Harrison	44	118	29	4	80	25
I. Thomas	42	130	20	18	97	14

TECHNICAL ARTICLES

Readers are requested to submit articles for publication in "A.R.," in particular constructional articles, photographs of stations and gear, together with articles suitable for beginners, are required.

Manuscripts should preferably be typewritten but if handwritten please double space the writing. Drawings will be done by "A.R." staff.

Photographs will be returned if the sender's name and address is shown on the back of each photograph submitted.

Please address all articles to the

EDITOR "A.R.,"
P.O. BOX 36,
EAST MELBOURNE, C.2,
VICTORIA.

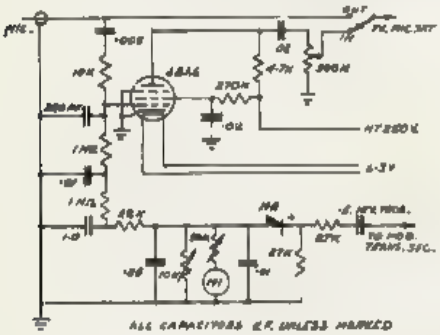
INCREASING TALK POWER

For Beginner or Low-Power Ham

This accessory of recent American origin will improve an average 30% modulated signal to more nearly 100% modulation. It can be connected between a crystal microphone and the rig as an outboard unit and can be switched out as desired.

The circuit uses a fast a.v.c. action, the control voltage being obtained from the secondary of the modulation transformer via the 0.5 μF. capacitor. This voltage is rectified by M.R. and after filtering, is applied as a negative voltage to the grid of the 6BA6 (a remote cut-off pentode). M1 is a voltmeter to set a reference level of —4.5v.

Referring to the rectified negative voltage, it will be seen that as modulation increases to 100% the negative voltage will increase, the time constant of the 6BA6 grid R/C network is designed so that the voltage does not undergo long term change, but varies rapidly at syllabic rate. In effect, the negative voltage on the 6BA6 grid is varying in sympathy with the syllables causing modulation, and this negative voltage depends on the percentage of modulation caused by the syllable



Now consider the signal applied from the microphone to the grid of the 6BA6. The gain of the microphone signal will depend on the bias applied to the 6BA6. If a weak syllable is spoken, the bias rapidly drops and the 6BA6 gain is increased, and vice versa if a strong syllable is spoken

If the input signal and bias increase beyond a desired pre-set level, the gain of the 6BA6 flattens at a relatively fixed level, clipping the waveform at approximately the 100% modulation level. The "processed" audio signal is fed to the rig from the slider of the 500K pot.

To Set Up. With an audio sine wave modulating the transmitter 100%, adjust the 10K pot. to give —4.5v. on the grid of the 6BA6, and adjust 50K pot. in series with M1 for 75% F.S. reading and mark 100%. The accessory is now ready for use.

—A. F. W. Haddrell, VK3ZFC.

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YOUTH RADIO CLUBS

Schools are back, which means the majority of the clubs are at work. If I leave myself out, can I get some supporters for a motion of hearty congratulations to those hardy teachers who teach kids all day and like them enough to come up for more in their lunch-time or after school when they carry on Y.R.C. work? To other club leaders—please don't write nasty letters. I like you just as much if you turn out in the evenings after a hard day's work.

We have spread even further Mr. C. C. Hiew, who is Y.R.C. leader at Secondary English School, Pontian, Johore, Malaysia, is interested in developing correspondence between members of his club and club members in Australia. If you are interested, please write directly to Mr. Hiew. Australian club members could do a lot to help the Malaysian youngsters by sending circuits, technical articles, and club information. I hope you club leaders will push this hard, and also send a set of instructional sheets you may have done for your club. Photographs of your activities would also help.

During 1964, the Y.R.C. Committee will organise a contest to find the most efficient operator belonging to one of our clubs. It is hoped to build this contest into an annual affair with State champions competing, with due publicity, to be Commonwealth champion. Fuller details have to be worked out, but leaders should start preparing candidates. The boys will go for this.

Result of the Training Chart Contest in VK2 was: first prize to Susan Brown, of Booragul High and second prize to Glendon McLane, of Inverell High.

Doug Williamson (Bass High) reports 114 Elementary Certificates issued, including a batch of 8 from Christmas Island.

My other three readers (have you brought forth that mouse yet, P.S.?) will be glad to know that Chas. Taylor, teaching at a new high school at Clontarf Beach (Q.) wrote me a newsy letter—for which many thanks. He hopes to have his own call sign in a few weeks, and is interested in developing Y.R.C. activities in his area, with several secondary school and a Scouts group. Some schools there such as the De La Salle College have had a club for about a year, but the others are to be organised. Good luck, Chas.!

More club leaders are needed—there are fertile fields in many places waiting for you. Despite remarks above, relatively few schools have a leader for a possible club—you could help at lunch hour or after school or in the evenings or week-ends.

Few Scout groups have anything beyond very elementary radio. If you find any collection of youngsters, it's a fertile field and you can do a lot of good for all concerned.

73, Ken VK1KM.

W.I.A. D.X.C.C.

Listed below are the highest twelve members in each section. New members and those whose totals have been amended will also be shown.

PHONE

Call	Cer. No.	C'nt-ries	Call	Cer. No.	C'nt-ries
VK5MS	34	306	VK6KW	4	211
VK5AB	45	301	VK3WL	14	211
VK6RU	2	297	VK3ATN	26	204
VK6MK	43	290	VK2JZ	81	201
VK3AHO	51	278	VK4HR	13	192
VK4FJ	31	270	VK4RW	23	186

Amendments:

VK3TL 62 141

C.W.

Call	Cer. No.	C'nt-ries	Call	Cer. No.	C'nt-ries
VK3KB	10	318	VK3AGH	71	259
VK3CX	26	303	VK2ARX	66	236
VK2QL	5	298	VK5RX	33	230
VK4FJ	28	281	VK3AHQ	79	230
VK3NC	19	282	VK3RP	56	229
VK6RU	18	258	VK3XB	75	226

Amendments:

VK3RJ	43	212	VK3AXK	30	179
VK3JF	70	190	VK3TL	78	156

OPEN

Call	Cer No.	C'nt-ries	Call	Cer No.	C'nt-ries
VK6RU	8	304	VK3AHO	76	282
VK2ACX	6	300	VK3HG	3	269
VK4FJ	32	298	VK3JA	43	252
VK2AGH	83	283	VK4HR	7	233
VK6MK	74	269	VK3BZ	4	231
VK3NC	77	263	VK3WL	45	225

New Member:

VK3SX 93 104

Amendments:

VK3HL	75	223	VK3TL	85	194
VK2VN	18	221			

RECEIVER DESIGN

(Continued from Page 5)

additional front-end gain was required, but would serve little use in providing additional front-end selectivity.

R.F. AMPLIFIER NOISE FIGURE

Another consideration in the evaluation of the front end of a communication receiver, especially at the higher frequencies, is the noise figure. The r.f. amplifier and the first mixer are the stages which determine the receiver noise figure. Numerous articles in the past have treated noise figure considerations, but let us briefly summarise a few of the more important points as related to the design of a low-noise r.f. stage.

A low-noise figure can be obtained through the use of low-noise tubes in the front end (e.g. 6BZ6 r.f. amplifier and 6U8 oscillator/mixer), and by obtaining a proper impedance match between the antenna and the grid of the r.f. amplifier. The gain should be just enough so that the receiver noise figure will not be affected by the succeeding stages. This will give the receiver the best rejection of cross-modulation, intermodulation and desensitisation, and at the same time yield the optimum noise figure.

SUMMARY

In closing, let us enumerate some of the important practices to follow in designing your own communication receiver front-end, or the points which should be considered in the evaluation of a commercial receiver.

1. The receiver should have at least one r.f. stage and two tuned circuits at the operating frequency. Two r.f. stages are desirable. The lack of an r.f. stage (antenna feeding directly to the mixer through a single tuned circuit) puts the receiver out of the "communication receiver" class.

2. Multi-tuned coupling circuits at the operating frequency will greatly increase the selectivity

3. Thorough shielding of the r.f. stage should be employed to reduce the leak-through of undesired signals to the mixer.

4. Extreme care should be taken in the wiring layout. All signal leads should be kept short.

5. Filtering, decoupling and by-passing should be used on all leads in the front-end other than signal leads.

6. For best operation, r.f. stages should be neutralised. This is seldom done.

7. Care should be exercised in the choice of r.f. tubes to minimise interference effects. Some recommended tubes for r.f. amplifiers include the 6BZ6, 6EH7 and 6EJ7. The 6U8 makes an excellent oscillator/mixer tube, and yields a much lower noise figure than the common pentagrid converter tube. ●

CAN YOU ASSIST?

The Publications Committee require the services of a voluntary

DRAUGHTSMAN

Please contact Editor "A.R.," P.O. Box 36, East Melb., C.2.

W.I.A. (V.H.F.) W.A.S. RULES

1. This award has been created in order to stimulate interest in the v.h.f. bands and is of a high standard to fully acclaim the proficiency of the recipients on their v.h.f. achievements. The award is to be known as the W.A.S. (Aust.) Certificate and is to be issued to any Amateur in Australia or overseas who satisfies the following conditions.

2. The Certificate will be awarded for contacts on the 50 Mc. band and higher frequency bands. All contacts must be made on the same band and cross-band contacts will not be allowed.

3. Portable operation will be permitted provided that such portable location shall be within the same State and not more than 25 miles from the fixed location in the case of Australian stations, and in the same call area and not more than 100 miles from the fixed location in the case of overseas stations.

4. The applicant is required to submit verifications from the following areas of the Commonwealth of Australia:—

(a) New South Wales, Australian Capital Ter., or Lord Howe Is.
(b) Victoria.
(c) Queensland.
(d) South Australia.
(e) Western Australia.
(f) Tasmania.
(g) Northern Territory.

In all, seven (7) verifications are required.

5. Additional credit will be given for verifications from other overseas countries, say, New Zealand or the Territory of Papua and New Guinea, in the form of a sticker to be attached to the Certificate.

6. It will be necessary for the applicant to produce documentary proof in the form of QSL cards or other written evidence which completely verifies a two-way contact has been made. By completely is meant that the time and date, signal strength, type of emission used, location of the claimed station and the frequency used must all be clearly shown on the verification.

7. Contacts may be made using any authorised type of emission and must be in accordance with the current P.M.G's. Regulations or those applying in the country of the applicant.

8. Submitted verifications must be exactly as received and not altered or marked. Failure to comply with this rule will lead to the disallowance of that card and may lead to the disqualification of the applicant.

9. All applications must be accompanied by a list setting out the details required by Rule 6, and stating whether any of such contacts were made while portable, and if so, giving that location. Sufficient postage must be enclosed for the return of verifications to the applicant, registration being included if desired.

10. The verifications and list (Rule 9) will be addressed to the **Awards Committee, Box 2611W, G.P.O., Melbourne, Australia."**

11. The verifications so submitted will be examined by the Awards Committee, who will arrange for the successful applicants' names and call signs to be listed in "Amateur Radio". Certificates will be forwarded to successful applicants through Divisional Councils or direct to overseas applicants as the case may be.

12. The decisions of the Awards Committee of the W.I.A. in the interpretation and application of these rules shall be final.

13. Notwithstanding anything to the contrary, the Federal Council of the Wireless Institute of Australia reserve the right to alter these Rules from time to time as necessary.

W.I.A. 50 Mc. W.A.S. as at 6/2/64

Call	Cert. No.	Add. Cntrs.	Call	Cert. No.	Add. Cntrs.
VK4HD	27	8	VK3ZGM	40	2
VK4ZAZ	28	7	VK2ME	41	2
VK4ZBE	29	6	VK2ZCF	48	2
VK2WJ	13	4	VK2ASZ	50	2
VK3ZFM	22	4	VK5LC	1	1
VK3ZHF	25	4	VK6DW	3	1
VK3IM	30	4	VK2AEZ	10	1
VK9AU	32	4	VK3XA	11	1
VK4PU	35	4	VK3GM	12	1
VK2ABR	46	4	VK3ACL	14	1
VK4HR	4	3	VK3ZD	16	1
VK3PG	5	3	VK2HO	17	1
VK2ABC	8	3	VK3ZEA	18	1
VK2VW	9	3	VK7ZAQ	34	1
VK5GG	19	3	VK5ZBR	37	1
VK5ZAX	20	3	VK5KO	42	1
VK5ZBL	21	3	JA4IO	44	1
VK5BQ	23	3	VK4ZLC	49	1
VK7LZ	24	3	VK3ZGP	51	1
VK3QV	39	3	VK2WH	15	
VK4RY	2	2	VK5AX	36	
VK3ZGZ	28	2	JA1BYM	43	
VK5ZZ/7	31	2	VK4ZAA	45	
VK7ZAO	33	2	VK6ZAA	47	
VK5ZMK	38	2	VK5ZSG	52	

NEW CALL SIGNS

AUGUST, 1963

VK2NR—Dr. D. W Boyd, 60 Lurline St., Katoomba.
VK2AVO—R. O. Chapman, 21 Kallaroo Rd., Lane Cove.
VK2ZBN—J. Bracken, 12 Walker St., Lismore.
VK2ZTS—L. T. Scotney, Lot 8, Hilltop Ave., Padstow Heights.
VK2ZTV/T—R. S. Gulson, 15 Pine St., Manly
VK3EG—E. H. Gray, 218 North Rd., East Brighton.
VK3ER—G. S. Kiernan, Fiskville, via Ballan.
VK3FC—R. E. W May, 24 Nethercote Drive, Mt. Waverley
VK3MO—I. J. Williams, 24 Lauriston St., Kyneton
VK3PE—E. Sundstrup, 10 Valley Cres., Glenroy.
VK3ZPM—P J Markman, 8 Purches Ave., Pascoe Vale South.
VK3SJ—A J. Sims, Gipps St., Yarram.
VK3ZAE—P. O'Shannessy, 19 Kilpatrick Ave., Shepparton.
VK3ZRL—W R. Dickson, Lot 8, Coghill St., Broadmeadows West.
VK3ZRO—R. W. Duckworth, 78 Ringwood St., Ringwood.
VK3ZSD—M. S. D. Fleer, 13 Pascoe Rd., Boronia
VK4FV—B. A. Stevens, Station' Army Married Quarters, Greenbank, Postal' 401 Sig. Regt., Greenbank.
VK4JZ—R. J. Zimitat, 10 Cyprus St., North Ipswich.
VK4ZCM—S. B. McGregor, 39 Conley St., Clontarf.
VK4ZTW—W A. Tomlinson, Hendry St., Tewantin.
VK5EO—E. H. Craill, 41 Minkie Ave., Mitchell Park
VK5HO—J R. Haskard, Oakbank.
VK5VF—The Wireless Institute of Australia, Station: Pine Lodge, Mt. Lofty; Postal: Box 1234K, G.P.O., Adelaide.
VK5ZDH—R. A. Jackson, 62 Shillabeer Ave., Croydon Park.
VK5ZJP—G. J. Perry, 131 Caulfield Ave., Clarence Gardens.
VK5ZRG—G. R. Graetz, 52 Paxton St., Willaston.
VK5ZYX—R. B. Broad, "Pine Lodge," Summit Rd., Mt. Lofty.
VK6OK—J F. O'Keefe, 36 Lanora Rd., Gooseberry Hill.
VK6ZAM—J. P. Morgan, Christian Bros. School, Highgate.

SEPTEMBER, 1963

VK1RD—R. Davis, 14 Hovea St., O'Connor, A.C.T.
VK1ZAC—A. M Campbell, C/o. Dept. of External Affairs, A.C.T.
VK2ATT J. M. Pattison, Orana, 407 Marrickville St., Dulwich Hill.
VK2ATU—E. A. Parker, 10 Park Ave., Springwood.
VK2AVR—L. E. Thorne, 25 Harefield Close, Epping.
VK2ZGB—J. C. Bennett, 63 Princes Ave., Roseberry.
VK3ARQ—C. J. Micallef, 5 Renown St., Coburg.
VK3ZAS—R. A. Simmonds, 32 Yongala St., Balwyn, E.8.
VK3ZCE—J. A. Cullin, 18 Baden Powell Drive, Frankston.
VK3ZOU—J C. Spence, Scotch College, Glenferrie Rd., Hawthorn.
VK4GW—G. S. L. Ward, 23 Ruth St., Corinda, Brisbane.
VK4US—Queensland University Squadron, C/o. R.A.A.F. Centre, Alice St., Brisbane.
VK4WK—A G. J. Ward, 37 Dale St., Maryborough.
VK4WN—J C. Willis, R.A.A.F Base, Amberley.
VK6FX—W. A. Fulton, Flat 4, 159 Labouchere Rd., Como.
VK6ZBD—R. S. Watkins, 48 Cobden St., Bayswater.
VK7ZTC—A. B. Carter, 22 Keane St., Launceston.
VK7BL—B. R. Barnes, Quiggins Rd., Wynyard.
VK7BB—A. E. Byrne, 30 Arthur St., Postina.
VK7LT—L. M. Tongs, 3 Ashburner St., Devonport.
VK9BN—B. R. Newman (Rev.), Mendi, Southern Highlands, T.P.N.G
VK9CA—M. McBride (Rev.), Mendi, Southern Highlands, T.P.N.G
VK9GC—A. H. Sandilands, Bishop St., Rabaul.
VK9GL—G. J. Lunney, P.O. Box 1029, Boroko, Pt. Moresby.
VK9HG—H. J. Hicks, P.O. Box 251, Lae, T.P.N.G.
VK9MD—D. A. Morgan, C/o. British Phosphate Commission, Christmas Is., Indian Oc'n.
VK9XI—Christmas Island Amateur Radio Club, Christmas Island, Indian Ocean.

OCTOBER, 1963

VK2ANP—J. H. Collister, 116 Hillcrest Ave., Greenacre.
VK2NA—Narrandera Radio Club, 50 Larmer St., Narrandera.
VK2AIC—R. H. Seales, Taylor Rd., Fern Bay.
VK2AIP—J. M. Burton, Glen Leigh Rd., Glen Innes.
VK2ALI—A. J. Pearce, 7 Eltham St., Dulwich Hill.
VK2ALL—E. L. Lloyd, Station: vessel "Noelani", Postal: 7 The Bulwark, Castlecrag Station.
VK2AYN—R. W. Huband, 44 Memorial Ave., Blackwall.
VK2ZNH—N. Hawkins, 121 Fiddens Wharf Rd., Killara.
VK2ZWJ—M. J Wallace, Flat 8, 748 New South Head Rd., Rose Bay
VK3VW—V. W. Stallan, 19 Vincent Cres., Werribee.
VK3ZAQ—B. J. Swingler, 8 Norville St., East Bentleigh.
VK3ZDW—L. A. C. McCosker, 20 R.T.C. Radio S.C.L., R.A.A.F., Laverton.
VK3ZEK—J. E. Kershaw, 5 Merlyn St., Footscray.
VK5CW—C. Hagoort, Larkdale Ave., Sydenham.
VK7NZ—Wireless Institute of Australia, Tasmanian Div., Northern Zone, 102 Charles St., Launceston.
VK7GK—G. K. Rieger, 98 Springfield Ave., Moonah West.
VK8ZMD—A. M. Dunn, 742 Dempsey Place, Rapid Creek, Darwin.

NOVEMBER, 1963

VK1AG—G. T. Allen, 7 Hedley St., Hackett, A.C.T.
VK1CX—B. H. Wall, 191 Duffy St., Ainslie, A.C.T.
VK2GR—G. E Riley, 8 Baringa Rd., Moridale.
VK2MG—Bathurst Radio Club, Webbs Chambers, 171 George St., Bathurst.
VK2TO—T Olrog, 1/4 Bannerman St., Cremorne.
VK2AUJ—A. L. Robinson, 97 Hamilton Rd., Fairfield.
VK2AUV—B. J. Kirkwood, 3/8 Baden Rd., Neutral Bay.
VK2AUW—P. R. Crosthwaite, C.S.I.R.O. Radio Telescope, Parkes.
VK2AVZ—G. W. Vaughan, 126 Archer St., Roseville.
VK2AXC—Cessnock Amateur Radio Club, Cr. Allandale and Wollombi Rds., Cessnock.
VK2AZA—R. M. Marsden, Station: 11 Trafalgar Rd., Toronto Heads; Postal. 43 Houston Rd., Kingsford.
VK2ZAJ—W. L. Ellis, 1 Sears Ave., Raymond Terrace.
VK2ZIW—A. H. Wass, 1 Cannons Pde., Forestville.
VK3AAW—Warrnambool & District Y.M.C.A. Youth Radio Club, Cr. Lava & Henna Sts., Warrnambool.
VK4LL—L. F. Coyle, 18 Burrum St., Bundaberg.
VK4LV—B. E. C. Lavender, Flat 4, 38 Stopford St., Wooloowin.
VK4SE—L. S. Stratford, Station: Marshall St., Goondiwindi; Postal P.O. Box 110, Goondiwindi.
VK4ZRM—R. M. O'Malley, 13 Belair St., Annerley.
VK5NH—Nailsworth Boys' Technical High School, Rakes Rd., Nailsworth.
VK5ZFC—A. E. Cooling, 20 Blencowe St., Elizabeth Grove.
VK5ZKR—C. M. Hutchesson, Yahl, via Mt. Gambier.
VK5ZNT W N Thomas, 15 Keevil St., Elizabeth North.
VK5ZRB—R. S. Bowman, Beau View, Parrakie.
VK5ZRR—R. R. Marks, 19 New Belair Rd., Torrens Park.
VK6GL—E. L. Gooding, Darkan.
VK6LX—L. J. Symonds, 48 Williams Rd., Kalamunda.
VK6ZBM—B. J. Byrnes, 4 Crowther St., Carnarvon.
VK6ZBN—A. R. May, 11 Rene Rd., Nedlands.
VK6ZEA—L. Jessop, 17 Victoria St., Sth. Perth
VK8HI—L. G. Reynolds, Station O.T.C. Radio Station, Darwin; Postal. P.O. Box 288, Darwin.

SUBSCRIPTIONS DUE

All members of the W.I.A. are reminded that annual subscriptions are now due and should be paid promptly to their Divisional Secretary. Non financial members will not receive a copy of "A.R.," and back copies may not be available upon request. To preserve continuity of your files of "A.R.," please pay your annual subscription now.

Correspondence

Any opinion expressed under this heading is the individual opinion of the writer and does not necessarily coincide with that of the publishers.

AUSTRALIAN D.X.C.C.

Editor "A.R.," Dear Sir,

Now that the elusive 300 mark has been reached in all the three sections of the above, I would firstly like to congratulate all the members who have obtained that very creditable tally.

I would also like to pay tribute to our Awards Manager (Alf VK3KB) who is doing such a mighty job and we should be thankful to him for the up-to-date lists of D.X.C.C. countries published from time to time. Thanks also to "A.R." for publishing these lists—something that is not even printed in the big noise overseas magazines.

After studying the latest list in "A.R." (Jan. 1964) some rather startling facts are noted. We now appear to have a total of 339 countries acceptable for the Australian D.X.C.C. Another has since been created by the A.R.R.L., but not yet on our list, so today there is 340.

Now off this number we must take two, the Leeward and Windward business, so if you were lucky enough to be licensed prior to 1/4/49 when VO was deleted it is possible for a total of 338 to your credit.

Since 1/4/49 of these 338, a total of 27 countries—CR, CR8, ET2, FF8, FI8, FN, FQ8, I1, I5, JZ0, PK1-2-3, PK4, PK5, PK6, UA0, UN1, VQ, VP2, VP2, VP2, VQ8, VS1, VS4, ZC5, ZD4, 8M2, 9S4, 9U5—have been deleted from the list, so if you are unlucky enough to be licensed today or in the future, there is only a total of 311 countries which you can work for the D.X.C.C.

A present-day licensed Amateur must feel proud to think he is so much better than these "old timers" prior to 1/4/49 that he is asked to concede to them a handicap of 27 in a total of 338—?? so that they have a chance to compete against him or retain their place in the top twelve listing.

But seriously, is it not time that something different was done to make the D.X.C.C more interesting to everybody concerned?

I am prepared to say that as long as the top group of stations listed today stay interested in the D.X.C.C. that nobody starting today can dislodge them from these positions. Candidly this, in my opinion, is a poor state of affairs and can only lead to disinterest by most DX Amateurs, particularly the younger members of the W.I.A. A young Amateur who starts looking towards getting to the top of the listing surely must say to himself what's the good I haven't a hope, and he is right, he hasn't, while we list the totals as we do today.

I think it is time to change the listings to a two-total, similar to the A.R.R.L. First list the number worked out of the present available countries, the order being arranged from that total, the second number being the total number of countries ever worked by that particular station, e.g. 238/270 D.X.C.C. being awarded from the second number. This will then not upset the tally of any member working for D.X.C.C.

One objection that will be raised to this idea is the extra work involved and imposed on the Awards Manager, but I do not think this would be very great, the double listing would only apply to the highest twelve in each section and once done would be complete for all time. Thereafter it would only need to be done to any new station as from time to time a new call appeared in the top twelve of each section.

I feel if the double listings were adopted it would create more interest and would certainly make it much fairer to the younger Amateur by putting both the earlier licensed Amateur and the present-day ones on an equal footing.

Finally, in case anybody gets the idea that this is for my own personal benefit, let me tell them right here that it will affect my total quite a bit and will be to my own disadvantage, but wherever I end up on the phone listing, I would be a lot happier to lose those countries credited to me, which have now been deleted and to know that everybody was on an equal and fair footing.

Bram Jellett, VK5AB.

ROSS HULL MEMORIAL CONTEST

Editor "A.R.," Dear Sir,

Intending to follow a 10-year practice of having a few DX contacts on 6 metres to renew old friendships, acquire new ones, exchange numbers and greetings, technical ideas and a little light conversation, on Boxing Day I switched on the 6 metre receiver.

The band was wide open with signals coming in from everywhere, but the activity was concentrated into the first 300 kc. of a band 4 Mc. wide. Like holiday campers who feel compelled to cram themselves into a small section of a large recreational area due to inherent love of neighbours, these operators mingled with the intimacy of eggs and bacon. No receiver could disentangle them. Occasionally one signal would stand out in splendid isolation and a voice would be heard crying "Your number received, wish you all you wish yourself, will QSL via the Bureau, 73, VK so and so now off and clear; CQ, CQ, DX."

Many of the old-timers were there awaiting the "treatment" like pests to be processed by itinerant dogs. Probably the understatement of the year was made by a polite and conventional VK5 operator well versed in the accepted operating procedures of the high frequency bands when he said, "Their method of using the v.f.o. on this band is rather unusual." More bluntly expressed—when not engaged in Amateur Radio activities these users of the "slick whistle" spend their time searching for mythical parents.

The contest virus spread to 2 metres where at the cost of a numerical inoculation one was allowed to wish the other fellow a brief seasonal greeting with a request to repeat the salutation on 6 metres and any other band in the v.h.f. spectrum one might happen to operate.

And all this to honour the memory of that fine Amateur operator and experimenter, the late Ross A. Hull. If this is the way the modern Amateur sees fit to pay homage to that illustrious gentleman, I would prefer to die a non-entity.

After an hour's listening to what might be mistaken for an auction sale or the dog pavilion at a country fair, I switched off and improved my mind reading to the accompaniment of the comparative music of a neighbour's lawn mower.

I should like to use your valued magazine, Sir, to convey my good wishes to my many friends I did not contact on 6 metres.

—H. A. F. (Adrian) Rose, VK3HZ.

ASSISTING BEGINNERS

Editor "A.R.," Dear Sir,

I must agree with Chas WIA-L3211 in his letter in December "A.R." Last year I made an appeal on behalf of some s.w.l's, and received three replies which were very helpful, although I was not able to make full use of the offers of assistance.

I feel the s.w.l's, or beginners would be helped more if the W.I.A. could produce a booklet, either typed or printed, giving a fairly comprehensive, accurate and easily understood outline of radio. There are many radio books on the market, all of which contain much valuable information to the more experienced listener.

Too many of the American books contain comparatively simple circuits, yet some particular parts, mainly coils, are not obtainable here nor are the details given. Tuning condensers vary considerably and standardisation of coils and condensers for simple s.w. sets would be a great help.

There is much information at hand. It should not be hard for a group of Hams to produce details of several simple, standard, easily constructed sets. This would save many beginners from losing heart and help to create greater enthusiasm in the S.w.l. Group and Youth Radio Clubs.

—Harry Major, WIA-L3102.

A CHALLENGE FROM KH6

Editor "A.R.," Dear Sir,

The members of our society, the Microwave Society of Hawaii, have long felt that the record-smashing 144 Mc. contact between Hawaii and California was only the beginning, and that the temperature "duct" phenomena responsible for this contact has not been exploited to the fullest extent possible.

It has been our feeling that under the proper conditions, a 144 Mc. contact between Australia and the Hawaiian Islands would be possible. Recent meetings with KH6UK, the present record holder, tend to strengthen this feeling, in that he too is convinced that such a contact is possible, provided that suitably equipped stations are available for tests.

We know that the temperature "duct" extends beyond Hawaii, to the west and south. It is doubtful, however, that this duct would extend to the equator. It is also known that such conditions also occur in the southern hemisphere during certain times of the year. It is our sincere belief that if certain favourable conditions prevail at a given time, on each side of the equatorial belt, that a 144 Mc. contact is a distinct possibility.

After much consideration, we wish to issue a challenge to the Australian v.h.f. enthusiasts, to attempt such a contact and maintain regular schedules with this station, KH6CMM.

KH6CMM is ideally situated for such an attempt, as the station is located only a few hundred yards from the ocean, with an unobstructed over-water path to Australia and or New Zealand.

Equipment employed at this station is considered excellent, by any standards. A transmitting converter provides 144 Mc. c.w. or s.s.b. output to drive the final amplifier, Eimac 4CX300As running one kilowatt d.c. input. This amplifier is a copy of that which originally appeared in the February 1960 issue of "QST" magazine. Power output is on the order of 650 watts on s.s.b., and 800 watts on c.w.

The receiving system at present consists of the popular "W2AZL converter", using cascode 417As, followed by a Collins 75A-4 receiver. However, we are now experimenting with the 7077 planar triode, and this, in conjunction with a lo-noise Nuvistor mixer, shows promise of being a superior converter. If this does prove to be the case, the 417As will be placed on the shelf. In either case, a 50-c.p.s. audio filter is available for weak-signal c.w. reception.

The antenna system, now under construction, is a time-proven array. It consists of four 13-element 24-foot Yagis, spaced two wavelengths, and provides 24.5 db. forward gain. We hope to install this array, horizontally polarised, on a 70-foot pole.

In addition to our 144 Mc. activities, KH6CMM and myself are also active on 50 Mc., running a full kilowatt on c.w. and s.s.b. The antennae are 6-element 24-foot Yagis, providing 15.0 db. forward gain. At each station, 7077 planar triode converters with 1.0 db. overall noise figures are employed ahead of a Collins 75A-4.

It is our hope that 50 Mc. TE propagation may again be possible between Hawaii and Australia during the spring and summer months, and we would welcome schedules on this band, as well as on 144 Mc.

Please mention this letter to some of the more serious individuals or groups, in hopes that someone might accept our challenge. Interested parties should contact us at 59-216 Kam Hiway, Sunset Beach, Oahu, Hawaii, for further information, and should include a brief outline of their equipment.

—F. G. Roemer, KH6CMM, President, Microwave Society of Hawaii.

FEDERAL AND DIVISIONAL MONTHLY NEWS REPORTS

(SEND CORRESPONDENCE DIRECT TO DIVISIONAL REPORTER NAMED AT PARA. END)

FEDERAL

FEDERAL CONSTITUTION ALTERATION

Federal Executive, on behalf of the Federal Council of the Wireless Institute of Australia, hereby gives notice that it is intended to alter the **Federal Constitution of the Wireless Institute of Australia 1947** as follows:—

(a) Delete Clause 21 and substitute—
"21. The Headquarters Division shall call for nominations annually from its members for appointment to the Federal Executive, such nominations to be received not less than 60 days prior to the conclusion of the fiscal year. The nominations which shall include the names of any retiring members of Federal Executive willing to re-nominate shall be submitted by the Headquarters Division to Federal Council for the appointment by preferential vote of seven members, two at least of whom shall be retiring members."

(b) Insert new Clause 21a—
"21a. The new Federal Executive shall take office at the conclusion of the Federal Convention which they shall attend, or where a Federal Convention is not held, within one month of the conclusion of the fiscal year. The Federal Executive shall determine its own offices in such manner as considered necessary."

(c) Delete Clause 24 and substitute—
"24. The appointment of Federal Executive which shall be finalised by the Headquarters Division not less than 14 days prior to the conclusion of the fiscal year shall be notified in writing to Federal Council prior to the conclusion of the fiscal year. The Federal Executive shall notify Federal Council in writing of the offices and appointees thereto within 28 days of the commencement of the new fiscal year or the Federal Convention whichever is the sooner."

Any member of the Institute not in agreement with the proposed alterations should notify his disapproval and the reasons to the Federal Secretary within 14 days of the publication of this proposal.

CALL BOOK MAGAZINE

The Federal Treasurer, W.I.A., has for sale at £1 post paid some recent back numbers of this directory of Amateurs. Only the American edition, listing K and W calls, is available at the moment. Apply Bob Bosse, VK3NI, 50 Cardigan St., Carlton, Vic.

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FEDERAL QSL BUREAU

In these notes in the January issue it was stated that Graham VK2AGH was handling cards for VK4JQ, Willis Island. This is NOT correct. The QSL manager for VK4JQ is W6HYG. Graham, however, is handling QSLs for VK4HG and VK4WV, ex Willis Island.

The box number of the Hungarian QSL Bureau has been changed. The new address is: Central Club of Hungarian Radio Amateurs, P.O. Box 214, Budapest 5, Hungary.

Copies of "CQ" for 1963 are available from this Bureau for free. First applicant gets them for postage. Do not send postage with application. Successful applicant will be advised of postage required.

Any station needing American Samoa on c.w. should look for K7VAX/KS6 around 0530z on 14065 kc. Bill, who is a teacher in Pago Pago, is on daily and will be there for at least two years. He has a good signal, but his operating speed is limited to 10 w.p.m. Full QTH is Box 458, Pago Pago.

After almost a month of light mail, incoming cards thickened up considerably over the Xmas week, to bring the December total to over 5,000 cards.

Was pleased to see Bruno Bossert, HG9QO (QSL notes Jan. "A.R."), in Melbourne during Xmas and New Year. Bruno will return to Sydney for a few weeks before settling in Melbourne for the remainder of 1964. Another Swiss Ham, Fred Beusch, ex HB9ABI and ex VK3HB, presently in Sydney, expects to visit Melbourne early in 1964. His movements thereafter are still uncertain.

Frank Hine, VK2QL, QSL manager for VK2 Division, is anxious to obtain the present address of VK2FR who was on Lord Howe Island for some time. He has apparently left L.H. and no forwarding address is known. Inform Frank, care Box 1734, G.P.O., Sydney.

The Federal Bureau is in receipt of a bundle of cards from the Austrian Bureau, addressed to OE1IW. His name is Karl Kriwanek and he is apparently now in VK. Any info as to his present QTH to the Federal QSL Manager please.

—Ray Jones, VK3RJ, Manager.

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NEW SOUTH WALES

HUNTER BRANCH

During the holiday period, activity on the v.h.f. bands has shown an increase and there has been some worthwhile DX, especially on 6 mx. Those responsible for much of this activity are Kev 2ZKW, Mac 2ZMO and Stuart 2AYF. In addition, a real first was scored by Des 2ZDN when he worked Sydney on 432 Mc. Considering the short time which has been available on this band, Des must be congratulated for his pioneering work. Not all contacts have been conducted on v.h.f., however, as many of the h.f. boys have been re-building and testing the gear. Harold 2AHA has finally managed to get "Big Bertha" on the air, running several watts of sideband to an 813. Reports are that this is a potent signal and Harold is pleased with the lack of t.v.i. Frank 2FC has had some success with the series gate modulation, but he claims that it is still capable of improvement. He is looking for some information on the system from someone who has used it successfully.

Otto 2SI is still battling with his Rothman system which was found to be unsatisfactory with a pi coupler. There were also some modulation troubles at 2AWX, but these have been resolved and the signal now sounds a little better. Now a man of considerable leisure, Jack 2KQ is thinking about being a regular user of the bands, his signal on 80 being the customary 59. Bill 2ZL still watches the one-eyed monster in preference to listening to the Monday night broadcast, but as soon as he has all the answers to the quiz questions, he'll come back to the fold. Bill 2XT is not sure whether to put s.s.b. or a.m. in the new car since the amount of room is not as great as in the previous vehicle and time between refits and conventions is all too short. Chris 2PZ has some aerials on the German monster but no Amateur gear as yet.

It was pleasing to see that second and third prizes for the two mx hunt at the State Convention were taken out by Les 2RJ and Bill 2XT. This proves their ability as jigsaw puzzlers is above average. According to all reports Lionel 2CS is never at home these days and he was heard to remark the other day that since he has retired he's been wondering how he ever made enough time to go to work!

Don't forget the next meeting of the Branch is the Annual General Meeting and Election of Officers for 1964. This will be held in Room 15, Classroom Block, Newcastle Technical College on Friday, 6th March, at 8 p.m. As well as the election, some other entertainment has been arranged, so come along and bring some hecklers with you. Don't let them have it all their own way. See you there, 73, 2AKX.

CANBERRA RADIO SOCIETY'S EASTER CONVENTION

The committee of the above Society has decided to organise an Amateur Radio Convention at Canberra in the coming Easter week-end. The programme is as follows, the times shown being subject to minor changes.

Friday, 27th March: Midday to 6 p.m.—Mobile Contest, submit logs for any two-hour period with the last QSO logged, being made inside VK1. 7-11 p.m.—Gathering at the Society's Club Rooms (VK1ACA). Tea and coffee, etc., will be available and possibly films of interest will be shown.

Saturday, 28th March: 11 a.m.-12.0 p.m.—Picnic lunch at Cotter Dam Reserve. 12.30-1.30 p.m.—Rx sensitivity contest (details see below). 2.30 p.m.—Hidden Tx Hunt at Cotter and district (h.f.). 4 p.m.—V.h.f. Fox Hunt (inside Canberra). 8 p.m.—Dinner at the "Ren of Canberra".

Sunday, 29th March: 10 a.m.—Visit to A.N.U. Nuclear Physics. 2-3 p.m.—All-band Scramble. 3-6 p.m.—V.h.f and/or H.f. Fox Hunt, followed by Hidden Tx Hunt. 8 p.m.—Visit to Mt. Stromlo Observatory.

Monday, 30th March: 10 a.m.—Visit to Belconnen, the Naval Radio Base, housing the most powerful tx in VK land.

Details: Logs from Friday Contest are to be given in by 7 p.m. at the Club Rooms at Riverside, Kingston.

Rx sensitivity contest: You will be at the Cotter Reserve in the gully where receiving conditions are bad. A tx will have its power gradually reduced as phone code messages will be sent at specified intervals. Any antenna is allowed.

Accommodation: It is rather late but we hope that by this time most of the accommodation will have been fixed up through George VK1GB. Send a deposit of £4, stating what accommodation is desired to VK1GB, Dickson, A.C.T.

To find the Club Rooms, proceed east from the front of Parliament House, across a dual carriage way (King's Avenue) and W.I.A. signs will direct you from there.

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VICTORIA

WESTERN ZONE

We heartily welcome two new call signs to the Zone, Brenda 3KT and Harry 3ZX, who qualified for the full ticket. Brenda is John 3AFU's XYL from Clear Lake and Harry hails from Horsham. Mac 3AZM (Horsham) had the misfortune to lose his Bendix freq. meter in a recent fire. Bill 3AKW (Lubeck) is at last connected to the S.E.C. mains. Rodney ex 5CU, now 3UG, is permanently residing in Melbourne—works at the same QTH as Gordon 3GW, ex Rainbow, and about fifteen other Hams, including Ron 3OM. Neil 3AQD (Ararat) has completed his new shack and is radiating an excellent signal therefrom on 80 mx, running about 60w. to parallel 807s.

David 3ADS (Glenorchy) has replaced the ground plane with a dipole with satisfying results. Both David and John 3AFU are busy boys these days with C.F.A. networks, but still find time to appear on our Zone hook-ups. Merv. 3AFO (Horsham) has been brass-pounding of late in an effort to get Alex, a Horsham s.w.l., up to Amateur standard. Aged only 16, Alex has already passed all theory papers, so we are tipping another Ham will be in the Zone before long. Vic 3AKJ (Horsham) steamed up a Type 3 on 80 mx the other night. The first QSO for about seven

years. Welcome back, Vic. Another Vic., 3AEQ (Murtoa) is busily engaged in re-vamping a heavy duty power supply, but due to pressure of business these days finds it hard to keep at it. 73, 3AFO.

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QUEENSLAND

WIDE BAY & BURNETT BRANCH

Jimmy 4HZ has been on holidays again—how that young fellow gets around! Lee Downing persevered with the morse key and the P.M.G. rewarded him with a call sign of 4FX, and Dudley Lynch was successful at his theory examination. Here's my hand boys.

Harry 4ZHG shut up shop for the festive season and hied himself off to the Gold Coast, hob-nobbing with the V.I.P's, and the mermaids, although he would not have much chance to date them as his XYL (Audrey) and the harmonics went with him. Since he has been back home, the spiders are spinning webs in the rig as he is busy building a boat. Perhaps he is still thinking of those mermaids.

The Youth Club has re-commenced again after the holidays, but associate John Lind, Harry's instruction partner, and 2 I.C. of the electrical distribution in this centre, has been transferred to Brisbane (maybe to sit in the manager's chair) so that leaves Harry doing the instruction on his own. So he has the junior boys one week and the seniors the other. It helps to keep him out of mischief and his mind off the mermaids.

Bill Tomlinson, of Tewantin, who is now 4TW, is too busy to use his call sign. He is flat out keeping other people's square eyed monsters perking. He should slow up and live longer. They say only the good die young, so he should be right for a few years yet. 73, Fred Cox.

TOWNSVILLE AND DISTRICT

With the advent of the Ross Hull Contest, I must say that the boys in the south are having a field day almost every other day. The QSO numbers being exchanged by some of them are really fantastic, when one looks back to the past contests. Sorry to report that these fantastic openings are not for the north. Personally I have only managed 28 QSOs for approx. 80 hours operating. At long last managed to work a VK8, so have only to hear and work a VK6 and then I can worry Alf 3KB to send along the necessary award. Alf will have to work overtime getting the awards out as some say that they have W.A.S. every few days. Congrats. to some of the newcomers that have earned this award as I have been trying for five, or is it seven, years.

The other bands are not yet open wide, maybe due to the extra high noise level. Only four local stations heard now on the band. Wonder what has happened to them? Charlie 4BQ and family up on the Tablelands for the holidays, while Owen 4OV and his family are all the way in from Mt. Isa to spend the vacation on Magnetic Island. Ere this is read, I will be on my annual pilgrimage to Melbourne and all points north. Must try and miss the onset of the wet season, maybe a cyclone if predictions are correct. 73, 4RW.

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TASMANIA

Remember to vote at the forthcoming Council elections. We hope to see you at the Divisional Dinner to be held at Launceston on Saturday, 21st March, 1964; the Northern Zone is arranging matters this year and we confidently expect a very wonderful event, so do not miss it.

December and January have been months for mobile and portable work, despite the very windy weather. Stations heard away have been Ken 7KH, Jack 7JB, Terry 7CT, John 7JF, Harold 7MZ, Lee 7KC, Snowy 7CH (mobile marine), Den 7DK and 7ZMH. We have also had some DX visitors. We were pleased to meet Guy and Alain who operated FB8YY at Adelie Land, and I personally rejoiced at the opportunity to speak French with them and thank them for their patience. The other DX visitor was Charles K2BOZ, a s.s.b. fiend on 20 mx, aboard the U.S.S. Glacier, which called at Hobart early in February. Charles gave us a delightful and much appreciated impromptu address at the February general meeting of the Division.

Lee 7KC has successfully got operating a one-watt s.s.b. rig and it sounds good too. Finally, a personal comment. Thanks to Michael 7ZAV, who wrote the monthly notes while I have been out of action with my injured hand. The fact that I contribute these notes indicates that I am well on the way to a full recovery after the lapse of six months. I thank all those who so kindly helped me, whether by visits or by QSO, during my enforced idleness. I especially thank Ken 7KA who loaned me a ham-band receiver for use in the hospital, and David 7ZAY and Ted 7EB who visited me regularly. Thank you chaps, one and all. With very 73, 7ZZ.

NORTH-WEST ZONE

First meeting of the year has been held, and if the attendance is an indication of things to come, it looks a very promising year in store. We were pleased to welcome visitor 4KX and Reg 7ZAO, who has been transferred in his job from the southern zone. Also present was Athol 7LR, who unfortunately has little spare time for Amateur "doings", but is always there to lend a hand when needed.

Big event of the month is the N.W. Hamfest to be held at Port Sorell. At the time of writing this promises to be a very good day's outing and much time and effort have gone to this end, particularly on the part of organiser Basil 7BL. Even the tide has been organised to allow cricket to be played on the beach.

Some 2 mx DX has been worked recently and some DX on 40 and 20. Concern has been expressed at the number of "Commercials" on 80 mx. How about that I.T.U. Fund donation? Believe Athol 7SW is back on the air after all that flap about t.v.i. Sorry to hear associate Ernest Greenhall is ill in hospital. Wish you a speedy recovery, Ernest. 73, 7ZBH.

HAMADS

Minimum 5/-, for thirty words. Extra words, 2d. each.

Advertisements under this heading will only be accepted from Institute Members who desire to dispose of equipment which is their own personal property. Copy must be received at P.O. Box 36, East Melbourne, C.2, Vic., by 8th of the month, and remittance should accompany the advertisement. Call signs are now permitted in Hamads. Dealers' advertisements not accepted in this column.

FOR SALE: AR88D Rx, £90. Geloso 222TR Tx, £90. Both in mint cond., had little use. Offer? VK3ANV, Box 239, Bairnsdale, Vic.

FOR SALE: Collins equipment of the late VK3JK. 32S1 Transmitter, £345. 75S1 Receiver, £345, or offer. All offers in writing to W. L. Jackson, VK3XM, 23 Malane St., Ormond, S.E.9, Vic.

FOR SALE: Gear ex late VK3QK: Eddystone 888 Receiver, new condition; BC457A Command Xmitter (7 Mc.); SCR522 Transceiver, with genemotor supply; Kingsley KS9'er; Type 109 Transceiver; Link Receiver F/M type 1305, tuned Channel 5 (new); CPR55 Range Indicator; Xmitter Tuning Unit TU9B; 109 Power Unit MK. II.; Dynamotor type DA1A; Roof Indicator Unit Y10QB/5000; W/T Set 109 Mk. II.; 230-200 volt Transformer; complete home-built a.m. 150w. Transmitter, Geloso v.f.o., t.v.i. proof, with power supply in rack; Dynamotor Unit PE94B; plus miscellaneous valves, sockets, etc. All equipment in working order. Best reasonable offers accepted. Contact Arthur Evans (VK3VQ), phone 99-2817, or Arthur Tinkler (VK3ZV), phone 29-3446 (Vic.).

FOR SALE: Complete home-built Geloso v.f.o., plate and screen modulated Transmitter; and R107 Receiver. Also Type 3 Mk. II. Transceiver complete. In good order, offer? Equipment of ex late VK3CH. C/o. N. Harris, 1 Duncan St., Birchip, Vic.

FOR SALE: Hallicrafters SX111 Rcvr., 80 thru. 10 metres and WWV, a.m., c.w., s.s.b., selectable sideband, large slide-rule dial, 0.5 to 5 Kc. selectivity, xtal cal., noise limiter, notch filter, as new condition, £190. VK2DM, 40 Ware St., Fairfield, N.S.W. Phone 72-5601.

FOR SALE: Model 840C Eddystone Comm. Receiver, 480 Kc. to 30 Mc. Excellent condition. Price £65. Mrs. J. Anderson, 14 Moore St., Toronto, 2N, N.S.W.

FOR SALE: Trans. Cabinet, ducoed grey, 68" high, 22" deep, 26" wide, price 30/-. Smaller Cabinet, ducoed grey, 20/-. Power Supply parts; back issues of "QST", "CQ" and "Short Wave Magazine"; text books. VK3DM, 110 Francis St., Ascot Vale, W.2, Victoria. Phone 37-4071.

FOR SALE: Wagner Sideband Transceiver, covers 80, 40, 20, 15 and 10, upper or lower sideband, break-in c.w. with audio tone monitor, 2.1 kc. mechanical filter, two v.f.o's. with 1 kc. accuracy, built-in vox, p.t.t., xtal cal., "S" meter, 80w. input, in-built relay for linear, only 15" x 10" x 6", complete with a.c. power supply and speaker in matching cabinet. Still under factory warrantry, £390. VK2DM, 40 Ware St., Fairfield, N.S.W.

SELL: Collins 32S1 Transmitter, with 512F2 power supply, £360. 75S3 Receiver, £330. All in excellent condition. J. G. MacIver, 21 Hurd Tce., Morningside, Brisbane.

SELL OUT: Best offer. Commercial Power Supply, 1,000v.-1,200v. c.t., 500v. c.t., four 866As, Filters, Fil. Trans., 1 chassis, 1 Trx, pair 807s, 5" C.r.o., Super Pro Rx, A.c. Relays, Valves, Condensers, etc. A. O. Brand, 37 Pacific Pde., Long Jetty, N.S.W.

SELL: TBY Transceiver, 28 to 80 Mc., complete with original Handbooks, Phones and Mike, ideal mobile or portable, £10. Cyldon 10 Channel Teletuner, £9. VK3ZKA, Phone 23-7480.

SELL: Woden UM3 mod. trans., £5. Woden UM1 mod. trans., £3. A & R power trans., 1,000v. aside at 500 mA., tappings down to 500v., £5. A & R filter chokes, 2 only, £2 each. Geloso 222 transmitter, faultless performer, £85. Byer 55 tape recorder, goes but needs a little work, £10. VK3AHT, Phone 314-6760 (Vic.).

SELL: 3 element 14 Mc. Beam and 40 ft. Steel Tower, with prop-pitch motor, £75. Heathkit Balun, £6. M. Hilliard, 57 Gardenia St., Blackburn, Vic.

SELL: 5AX Pre-selector, £3. Collins 3.1 Kc. Mechanical Filter, £10. 50 Mc. Mobile Converter, £10. 10 element 144 Mc. Yagi, £5. M. Hilliard, 57 Gardenia St., Blackburn, Vic. Phone 89-2498.

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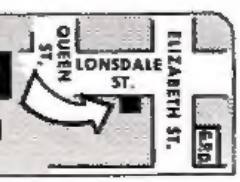

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